IAEA PROGRAMS OF SAFEGUARDS

HEARING

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IAEA PROGRAMS OF SAFEGUARDS

WEDNESDAY, DECEMBER 2, 1981

United States Senate,
Committee on Foreign Relations,
Washington, D.C.

The committee met, pursuant to notice, at 10:37 a.m., in room 4221, Dirksen Senate Office Building, Hon. Charles H. Percy (chairman of the committee) presiding.

Present: Senators Percy, Biden, Glenn, and Cranston.

The Chairman. I call this meeting to order.

I think in the year 1981 this is the latest we have ever started a hearing. As a committee we try to start promptly on time, but floor action had to take precedence today, and we had two back to back votes. We deeply regret the interference with your own schedules, and we will move right along.

Senator Hart, may I ask a question of you?

Have you voted on this last vote?

Senator Hart. Yes; I have.

The Chairman. You have, good. I could not find you on the floor.

After I make my opening comments, I will recognize you immediately for your own prepared statement.

This committee has previously had several days of hearings this year on various aspects of nuclear nonproliferation, including several sessions on the Israeli attack on the Iraqi reactor. The committee has had executive hearings and briefings on the Pakistani nuclear program. In addition, Senator Glenn and I are both members of the Energy Subcommittee on Governmental Affairs where I have chaired two hearings on various aspects of nuclear proliferation.

I cannot overemphasize how vital the control of nuclear weapons potential is to world peace and the survival of humankind. It is the most important single issue that any of us will deal with in our Senate careers in our lifetimes.

Today this hearing is focusing on one particular aspect of nuclear nonproliferation, the International Atomic Energy Agency [IAEA]. The Agency is so important to the success of the nuclear nonproliferation effort that it requires the most careful attention. It is the heart, it is the conscience of the Nuclear Non-Proliferation Treaty [NPT] and the international nuclear safeguards regime. It is the verification agency of the nuclear nonproliferation regime. The failure of the Agency to carry out its mission, unless a replacement should be found, would result in the dissolution of the Nuclear Non-Proliferation Treaty and undoubtedly lead to the spread of nuclear weapons.

There are increasing signs that the Agency is beset with technical and political problems. Technical problems include inadequate numbers and the quality of inspectors, inadequate monitoring equipment, and restrictions on inspectors. Some of these technical difficulties, of course, overlap into the political arena. One of the most serious problems in this respect is a tendency to politicize the IAEA on developed versus developing country grounds.

The developing nations often charge that the IAEA is a vehicle by which the developed nations restrict access to peaceful nuclear energy at the same time that they maintain enormous stockpiles of nuclear weapons. And, to be fair, it is true that the nuclear states have not fulfilled their promise in the NPT to reduce those stockpiles of weapons.

The developing states have, however, in my mind, gone in wrong directions, wrong for the peace of the world and wrong for the purpose and intent of IAEA, by pressing for unrealistic quotas of inspectors and influence in the Agency to which they bring few technical qualifications. I think it is contrary to the whole intent and purpose of this international organization to require quotas of people that may by simply inadequate for the job.

There are many criticisms of the IAEA and many that can be justified. The most resounding was delivered by the Israelis when they destroyed the nuclear reactor of Iraq. The Israelis, and for that matter, others, strongly suspected that Iraq intended to manufacture a nuclear weapon, and did not have confidence that the IAEA safeguards were sufficient either to reveal those intentions or prevent them from being realized.

More recently, there have been strong suspicions that Pakistan intends to manufacture a nuclear device, despite IAEA safeguards. Other nations give cause for serious concern.

Just last week, the Commissioners of the Nuclear Regulatory Commission [NRC] expressed their concern about the effectiveness of the IAEA.

I shall include without objection a copy of that letter of the NRC to Members of Congress in the record.

[The letter referred to follows:]

U.S. Nuclear Regulatory Commission,
Washington, D.C., November 27, 1981.

Hon. Larry Pressler,
Chairman, Subcommittee on Arms Control, Oceans and International Environment, Committee on Foreign Relations, U.S. Senate, Washington, D.C.

Dear Mr. Chairman: Over the past several years, Commissioners have expressed concern to the Congress regarding the adequacy of International Atomic Energy Agency (IAEA) safeguards. The Commission has noted that the NRC has had little or no safeguards information in making its export determinations under the Nuclear Nonproliferation Act.

In keeping with our responsibility to keep Congress fully and currently informed, we are writing to update our assessment of IAEA safeguards. The NRC is concerned that the IAEA safeguards system would not detect a diversion in at least some types of facilities. In addition, we are not confident that the member states would be notified of a diversion in a timely fashion. We are also communicating our concerns to the Executive Branch in the interests of helping to bring about improvements in IAEA safeguards.

We are reviewing our responsibilities under the Atomic Energy Act of 1954, as amended, for the licensing of nuclear exports in the light of these concerns and will inform you of our conclusions.

Sincerely,

Nunzio J. Palladino.

The CHAIRMAN. The letter indicates that the NRC will review its export policies for nuclear materials due to shadows cast upon the reliability of IAEA safeguards.

I would like to quote briefly from that letter:

> The NRC is concerned that the IAEA safeguard system would not detect a diversion in at least some types of facilities. In addition, we are not confident that the member states would be notified of a diversion in a timely fashion.

In light of these criticisms, there is obviously great need for a full scrutiny of the IAEA. Until confidence in the safeguards regime is restored, the Agency cannot carry out its functions to the satisfaction of the nations of the world. It certainly cannot serve as a model for an international verification agency for other types of arms control agreements unless these serious doubts are resolved. This hearing will constitute part of the congressional scrutiny of the IAEA. Frankly, I hope that we find that many of the criticisms are unfounded or exaggerated, for many of us have placed a great deal of hope in the ability of the IAEA to contribute to the control of nuclear weapons.

I am, however, after the truth of the matter and intend to hear all evidence and all testimony with objectivity.

I would not want to end this statement on too negative a note. If the political will exists—and I believe that it does—these problems can be resolved. I have seen no problem and no charge made against IAEA that cannot be somehow corrected. I believe and fervently hope that they are correctable, or we shall all have to undergo an agonizing analysis of possible alternatives.

We are fortunate to have specially qualified and capable witnesses today. I trust that they will provide constructive criticism and helpful suggestions.

Would anyone care to make an opening comment on behalf of the minority?

Senator Glenn, I think you would be very appropriate in that regard.

Senator GLENN. I would appreciate the opportunity, Mr. Chairman, because I think that what we are dealing with today is very significant. I think that recent information that has come out about our nonproliferation efforts, shows that the regime that we are dealing with is a fragile one. Its flaws are becoming increasingly apparent over the years; and I think we are really in deep trouble.

For one thing, we have an increasing number of nations that are obtaining the capability to make weapons. In fact, I think that the technology of fission weapons design has now reached the point where it really is not necessary for a nation to conduct nuclear tests in order to be reasonable assured that a constructed weapon will work.

I would add that at Alamagordo, in July of 1945 it was a plutonium weapon of the type that was used at Nagasaki that was tested, but doing without testing is something that has been with us a long time. For the second bomb ever detonated was a gun type using U-235; we used it at Hiroshima, without a test of this kind of bomb being conducted in advance. So I think it is clear that today a country does not need to have tests to know that it has a reliable nuclear capability.

Pressures against testing will not be sufficient to prevent the building of untested nuclear arsenals if sensitive technology is developed or transferred without stringent controls. We have worked intensively to get other supplier countries to restrict their transfers of this technology and have tried repeatedly to get unified controls into effcet. The control of enrichment equipment and reprocessing equipment is still vital if we are to prevent the spread of nuclear weapons, and yet we see some of those efforts going by the board these days. An article in the paper this morning, an editorial that I wish to enter in the record of this hearing, indicates what the administration now seems to be doing with regard to nuclear proliferation, knocking down some of those barriers to sensitive technology transfers that we have tried to establish over the last several years.

The CHAIRMAN. Without objection, it will be entered into the record.

[The editorial referred to follows:]

[From the Washington Post, Dec. 2, 1981]

LETTING NUCLEAR DANGER SPREAD

The Nuclear Regulatory Commission's resounding vote of no-confidence this week in the international system of safeguards on which trade in nuclear technology is premised is but the latest in a series of events and policy shifts that has all but wiped out American non-proliferation policy.

As one who once had a hand in helping to formulate that policy during part of the Carter administration, I have watched with awe the rapidity with which the dismantling has taken place.

The erosion began last spring in a close vote by the Senate Foreign Relations Committee approving an administration request to permit a large new assistance program for Pakistan by waiving the law that prohibits assistance to a country trying to make nuclear weapons. The vote attracted little attention at the time, yet it was a significant milestone: in the first test of its own sanctions against nuclear proliferation, the United States was choosing to ignore them.

By the time the waiver reached the Senate floor a few weeks ago, there was no remaining doubt that Pakistan is aggressively pursuing every possible technical route to building a bomb. It may be ready to stage a nuclear explosion in one year.

Nevertheless, the full Senate chose not to vote on the wisdom of the waiver. Sen. John Glenn (D-Ohio), trying to redraw the line he had helped write into law a few years ago, offered an amendment requiring termination of American aid if Pakistan went all the way and actually detonated a nuclear bomb. But the message that was conveyed that evening to Pakistan, and who knows how many other interested governments, was not that the amendment had passed—which it had, just—but rather that nearly half the Senate—45 members—had voted against it, in the name of preserving "flexibility" for the president. The flexibility in this case is the flexibility to do nothing—as this country did when India exploded its bomb in 1974.

Meanwhile Israel had bombed Iraq's research reactor. The International Atomic Energy Agency's response was not to investigate why Iraq, despite having no commercial nuclear facilities, was stockpiling hundreds of tons of uranium ore. Nor did it or any other group consider intelligence findings that Iraq was indeed pursuing a nuclear capability, despite having renounced the right to do so by signing the Non-Proliferation Treaty. Instead the IAEA called on its members to offer Iraq "emergency assistance" to rebuild the destroyed reactor.

France, Iraq's original supplier, responded. Discussions between France and Iraq have been under way since last summer. American officials are apparently not privy to the terms being negotiated, especially whether the new reactor will be as inexplicably large for its asserted "research" purpose as the old one was, or whether this time France will insist that the reactor not be fueled with highly enriched, weapons-usable uranium.

France's recent agreement with South Africa does not offer much ground for optimism. The United States has been trying for years to get South Africa to accept safeguards on its nuclear facilities. Its leverage was the supply of fuel rods for South Africa's first power reactors scheduled for completion next year. But American law requires that South Africa first accept safeguards. Suddenly, in mid-November, it was announced that the reactor would be loaded on schedule with fuel rods made in France, and without safeguards. The action took American officials completely by surprise, cutting the ground out from under the U.S. government's position.

> A few years ago, the nuclear supplier nations agreed to an informal moratorium on the transfer of reprocessing and enrichment plants—facilities that produce material that is directly usable in bombs. This year, for the first time since that agreement, a non-nuclear weapons state—Mexico—has invited bids for the construction of power reactors and let it be known that it wants "advanced technology"—enrichment and reprocessing—to be part of the deal. The suppliers' responses will be a major test of how much, or how little, is left of the will to slow nuclear proliferation. The outlook is clouded by the administration's recently announced willingness to transfer classified enrichment technology to Australia, making it all the harder to say no to others.
>
> Several other thresholds have been quietly crossed. In extending an agreement that allows U.S.-supplied fuel to be reprocessed in Japan's pilot reprocessing plant, the administration, without prior congressional consultation, dropped two key provisions of earlier versions. One of these dealt with whether reprocessing plants, because they provide direct access to weapons-usable materials, can ever be effectively safeguarded. The other retained U.S. control over Japan's use of the separated plutonium.
>
> U.S. negotiators, unable to find acceptable conditions for ending nuclear cooperation with India, are reportedly considering major concessions. The United States wants international safeguards to continue to be applied to the used fuel (containing more than a ton of plutonium) it has supplied to India over 18 years. India has refused, and is reportedly considering a unilateral renunciation of the agreement and its attendant safeguards. To avoid that damaging precedent U.S. negotiatiors may allow India to reprocess the U.S.-supplied fuel.
>
> The Reagan administration let it be known from the outset that it planned a dramatic "shift in emphasis" from the Carter non-proliferation policy. It would emphasize American leverage as a "reliable nuclear supplier" rather than trying to restrict access to sensitive nuclear technologies. But leverage is only leverage if one is prepared to use it. The administration's easy acceptance of Pakistan's nuclear bomb program and many subsequent decisions signaled clearly that it was more interested in encouraging nuclear trade. The message was picked up not only by potential proliferators but also by other suppliers—France, especially—that had reluctantly gone along with earlier U.S. insistence on a tough non-proliferation policy. Congress, overwhelmed with other concerns, failed to respond. The result has been a frighteningly swift unraveling of the containment net that had been slowly stitched together in the seven years since India's nuclear explosion, shocked the world. No one knows where it will end or what it will now take to stop the process.

Senator GLENN. We will hear a great deal of criticism this morning of the IAEA safeguard system, I am sure, but our aim is to strengthen the safeguard system.

Earlier this year, Mr. Chairman, after our hearing on the Israeli raid on the reactor in Iraq, I made some recommendations regarding improvement of IAEA safeguards. We incorporated most of those into the resolution passed by the Senate on July 18 by a vote of 88 to 0. I will not read all of those recommendations this morning, but they were largely ignored. I asked the President for a meeting prior to his going to Ottawa. He did not wish to see me on this subject, or could not because of his schedule that week which was very busy, I am sure. After a vote of the Senate of 88 to 0, however, the President did not even bring this up at Ottawa, as I understand it. It was merely mentioned along with a number of other unclear issues in item 37 in the meetings final communique, I believe. Let me note, by the way, that the reason we thought that having this issue raised at Ottawa was so important was because the major nuclear suppliers of reprocessing and enrichment equipment, were going to be at Ottawa. The meeting came immediately after the Iraq raid when international attention was indeed focused on this problem.

As I mentioned earlier a lot of information is coming out these days, on our nonproliferation efforts and this morning I am releasing two reports on the subject of IAEA safeguards. I have included them with the press releases that are at the press tables. One is the one by Mr. Slobodan Nakicenovic, who is a retired former Director of the IAEA Safeguards Operations. I do not necessarily subscribe to all the views in his paper, but I think it is a very interesting document and indicates the needed improvements in safeguards.

The second document is the executive summary of a report prepared for NRC by the Pacific Northwest lab of Battelle in Richland, Wash. It is entitled "Implications of IAEA Technical Objectives."

In the first report which is a commentary of IAEA safeguards, I would like to call attention to page 12. There Mr. Nakicenovic runs through a number of needed improvements in safeguards which I think are all self-explanatory. Another page I would call attention to is page 20 of that report in which he mentions in about the middle of the page, an instance when IAEA inspectors found and reported to the IAEA Inspectorate an unauthorized removal of a fuel element; this event, however, was not reported to the IAEA Board of Governors, according to the report.

Regarding the second report, the one that is the executive summary, I would like to point out first the material on page 7, Roman numeral VII. The analyses here indicate that concerns about the achievability of implementing better IAEA safeguards are not unwarranted. "Given the conditions and assumptions under which IAEA safeguards are being implemented at the present time, the technical objectives are not generally attainable, although they may be attained in some instances," the report states.

And on that next page, Roman numeral VIII, the report sets out the amount of inspection effort they feel would be necessary to effect the minimal inspections to achieve these technical objectives. In 1980, according to the report, it would have required 35,000 man-days of inspections. In 1979, the last year for which we had figures, there were in fact 3,300 man-days.

On the next page, Roman numeral IX, the report indicates the different inspection efforts as they break them down by facility type. I think these figures are particularly important, and I wanted to draw attention to those particular pages.

We also, Mr. Chairman, have the letter from the Nuclear Regulatory Commission to you, with carbon copies to the committee members. In this letter, the Chairman of the Nuclear Regulatory Commission questions the adequacy of International Atomic Energy Agency safeguards. It states:

> That we are writing to update our assessment of IAEA safeguards. The NRC is concerned that the IAEA safeguards system would not detect a diversion in at least some types of facilities. In addition, we are not confident that the member states would be notified of a diversion in a timely fashion.

I am sure we want to get into this a little bit later, but the Nuclear Regulatory Commission has six, as I understand it, basic criteria for licensing, and they are saying that they are not getting adequate information. Now we have repeated instances of statements on the floor by the distinguished chairman of this committee, by myself, by Senator McClure, and others regarding the fact that we expect NRC to determine this matter of safegurads adequacy—not just whether IAEA safeguards are in effect at a given facility or in a given country, but whether they are adequate. This is part of their function of government.

I think that this also is a topic that we may want to get into further a little later.

I will be through in a moment, Mr. Chairman.

I think we need once again to reemphasize the control over transfers of enriching equipment and reprocessing equipment. Those are both vital to making nuclear weapons. We do not have effective control over them now, and we seem to be moving away from efforts to get more control in those areas.

The President is apparently moving along a different direction than I think we should be moving, and I welcome the opportunity during these hearings today to bring out some of the inadequacies as we see it.

Thank you.

Senator CRANSTON. Mr. Chairman, I have a very brief opening statement.

The CHAIRMAN. Let me say that we have a problem with Senator Hart, who has to leave.

Senator CRANSTON. Well, why does he not go ahead?

Senator HART. That is all right. I have the time.

The CHAIRMAN. Why do you not go ahead? He said it is okay.

Senator CRANSTON. Thank you.

I want first to thank you Mr. Chairman for granting my request to hold a hearing of this nature on this very important matter. I have been very deeply concerned that this committee has been receiving information about weaknesses in the IAEA safeguards system over a period of many months and years, but that this information has been brought forward only in the context of our consideration of other controversies of a more pressing nature.

Unfortunately, in the case both of the Israeli strike against Iraq and the lifting of nonproliferation sanctions against Pakistan, when this matter did come before us, this committee and the executive branch have been preoccupied with immediate concerns and unable to focus more intently on the dangers of reliance on inadequate IAEA safeguards for international security.

Unfortunate, too, has been the tendency of Reagan administration officials to make it a matter of policy not to inform Congress of new information regarding safeguard inadequacies when this information might raise questions about other administration programs. To be specific, I have been informed by several individuals that senior State Department officials reached a decision to limit congressional knowledge about troubling information on IAEA safeguards in Pakistan. This decision was taken in an apparent effort to secure congressional approval for the $3.2 billion package of aid and F-16 sales to Pakistan without having serious questions raised about the adequacy of international safeguards to detect and prevent a Pakistani nuclear bomb test.

I deplore this decision to cover up weaknesses in the IAEA system—which I believe ill-serves U.S. security interests and complicates what should be a cooperative effort between the executive and the legislative branches to improve vital nonproliferation safeguards.

By contrast, I want to commend the Nuclear Regulatory Commission for taking seriously its statutory obligation to keep Congress fully and currently informed on nuclear proliferation developments by notifying Congress last Friday of its concerns about IAEA safeguards. I believe the NRC's conclusion that IAEA safeguards do not appear adequate to detect diversions of sensitive nuclear materials in many facilities is a watershed event. Now the NRC has unanimously concluded, as many of us have before concluded, that the IAEA as presently constituted cannot do the two things it is mandated to do: detect diversions of sensitive nuclear material, and give timely warnings of any such diversions to the international community.

What the NRC has concluded in effect is that IAEA safeguards are not fully safe and do not guard effectively.

Mr. Chairman, it has been my experience that whatever serious questions are raised about the glaring weaknesses of the IAEA safeguards system, those who would push for greater international nuclear commerce are quick to declare: but there is no alternative to the IAEA. Twice this year former IAEA inspectors have come forward and expressed their deep concerns about safeguards inadequacies, and twice the State Department has responded with deliberate campaigns to discredit these individuals and to cast their conclusions as those of disgruntled former employees.

Further, open discussion of safeguards inadequacies has been hampered by the State Department's reflexive desire to classify and hold close any information which raises questions about the IAEA system. International safeguards against nuclear bomb development are too important for us to mute concerns about their ineffectiveness. Of course we must strengthen the IAEA, not tear it down, but it does no good whatsoever to pretend the emperor is finally clothed when it is clear to the unbiased eye that he is stark naked.

If we are to begin to solve the problems of the IAEA, we must first recognize what those problems are, and if we are to maintain the viability of international nuclear commerce, we must make absolutely certain that such commerce is not based on a false sense of confidence in a safeguard system that appears from all indications to be a house of cards.

Thank you, Mr. Chairman.

The **Chairman**. Thank you very much, Senator Cranston.

Now, Senator Hart is the ranking minority member of the Subcommittee on Nuclear Regulation of the Environment and Public Works Committee, and we are very pleased to have you make a brief statement today.

STATEMENT OF HON. GARY HART, A U.S. SENATOR FROM COLORADO

Senator **Hart**. Mr. Chairman, may I add my word of thanks and congratulations to you and other members of the committee for scheduling and conducting these hearings, and my appreciation for having the opportunity to appear here.

There is no more important issue, in my judgment, than controlling the spread of nuclear weapons in the world; the focus on the inadequacy of the safeguards system that applies to nuclear technology and materials worldwide is, I think, among the most crucial responsibilities of the Congress of the United States. Just last week, as has been mentioned, the Nuclear Regulatory Commission made its concerns about these safeguards public.

Mr. Chairman, until those concerns are resolved, as ranking minority member of the Subcommittee on Nuclear Regulation, I would urge the NRC to suspend licensing of all exports of nuclear technology and materials, at least until it is confident that any diversion of nuclear material for weapons use can be detected. In light of the NRC's own admissions about the inadequacy of the safeguards system, it seems to me we can do no less.

You and other members of the committee have cited the NRC letter to several Members of Congress expressing its concerns that the current system is less than adequate, that the system would not detect a diversion in at least some types of facilities, and that the NRC has no confidence that member States would be notified of a diversion in a timely fashion. In short, the NRC has stated what many of us have suspected all along, and that is that we are placing our hopes of preventing the spread of nuclear weapons in a so-called safeguards system that is riddled with loopholes.

I think we have to consider three or four important facts of which many of you here today are aware. First, a nation can sign the Non-Proliferation Treaty, receive nuclear technology and substantial technical assistance, and then withdraw from the treaty and its safeguard systems on only 90 days notice.

Second, inspections which consist primarily of audits of inventory records—occur infrequently and are announced well in advance. This system leaves plenty of time for the undetected diversion of plutonium.

Third, when inspections do take place, inspectors are not only approved by the host country, they are restricted to facilities approved by the host country, and they are forbidden in many cases to look for or report clandestine nuclear activities, the very activities that they should be looking for.

And finally, in the event that some misuse of nuclear material or equipment, is detected, there is absolutely no guarantee of effective international sanctions.

This committee has already heard the disturbing testimony of the inspector who visited the Iraqi reactor just prior to the Israeli raid. He described how he had to use flashlights in some portions of that facility because adequate lighting was not available. He testified that keys were not available to areas of the reactor facility which may well have contained clandestine activities or unreported spent fuel. Indeed, his entire testimony underscored the existence of a system riddled with the kind of loopholes that I have mentioned.

The NRC I think deserves the commendation and support of the Congress for making its concerns about the safeguard systems public. I think more public discussion and a lot less secrecy may well force the upgrading of the safeguard system that so many of us feel is so urgently needed.

But right now, as they stand, those so-called safeguards are not sufficient to make the world community safe—and they do not guard against the spread of nuclear weapons. The safeguards are little more than a facade, and while they legitimize nuclear trade, they place the world in ever greater danger from the undetected misuse of nuclear weapons.

The NRC assessment of the international safeguard system leaves the United States with a very difficult choice: Should it abandon the IAEA altogether, or should it take steps necessary to make that agency an effective policeman of world nuclear activities? I think most of us favor the latter approach. If we abandon that agency, we will have nothing with which to replace it, and consequently, will certaintly fail in our efforts to prevent the spread of nuclear weapons.

I think the IAEA performs an important and vital role. The United States and other countries must recognize the agency's political and technical weaknesses, however, and in a concerted and sustained effort rebuild and strengthen that agency so that the world community will have confidence in the ability of safeguards to detect misuses of nuclear materials and equipment.

But as I indicated at the outset, Mr. Chairman, I think there is one step that this country and its appropriate agencies should take forthwith: to urge the NRC to suspend all export of nuclear materials and technology until we can have confidence that the diversion of that material can be detected. That is the very least our Government—and the agencies responsible for protecting human lives—can do.

I appreciate the opportunity to be here today.

The CHAIRMAN. We appreciate very much the leadership you have always exerted in this field, and we want to work very closely with you. There are overlapping committee jurisdictions sometimes, but we try to divide them cleanly. Senator Glenn and I both serve on Governmental Affairs where we have the Nonproliferation Subcommittee that we share, and we will work very closely with you.

And I want to thank Senator Cranston very much for suggesting this hearing today.

Thank you very much.

Senator CRANSTON. Thank you, Mr. Chairman.

The CHAIRMAN. Our first administration witness is Under Secretary Kennedy. We are fortunate to have an especially qualified group of witnesses today, and the Under Secretary will lead off.

Secretary Kennedy, we are pleased to have you back with the committee today.

STATEMENT OF HON. RICHARD T. KENNEDY, UNDER SECRETARY FOR MANAGEMENT, DEPARTMENT OF STATE, AND U.S. AMBASSADOR TO THE INTERNATIONAL ATOMIC ENERGY AGENCY, ACCOMPANIED BY JOHN BORIGHT, ACTING DEPUTY ASSISTANT SECRETARY, OFFICE OF NUCLEAR TECHNOLOGY AND SAFEGUARDS, BUREAU OF OCEANS AND INTERNATIONAL ENVIRONMENTAL AND SCIENTIFIC AFFAIRS, DEPARTMENT OF STATE

Ambassador KENNEDY. Thank you very much, Mr. Chairman. It is a pleasure for me.

The CHAIRMAN. I understand you have a time problem, so that any summary of your statement that you would like to make would be fine, because we have been delayed almost an hour now. The full text will be incorporated in the record.

Ambassador KENNEDY. Thank you very much, Senator. I appreciate it. But let me assure you that I am here to help the committee, and I can take whatever time the committee would like.

The **CHAIRMAN**. Thank you very much.

Ambassador **KENNEDY**. I am particularly pleased to be here, sir. Let me second the comments that have been made about the importance of the subject with which the committee is dealing this morning. There can be no more important subject, it is quite true.

So therefore I am pleased to have an opportunity to speak about the IAEA and some of its problems, because there are problems.

It is important at the outset to understand what IAEA safeguards are and what they are not. They are a critical and indispensable component of the worldwide nonproliferation effort, but they are not the totality of that effort.

IAEA safeguards are principally a detection and warning, not a prevention or reaction mechanism. The IAEA has no capability to physically prevent diversion, and it has limited enforcement authority. It has no authority or capability to search for nuclear activities away from defined locations. And IAEA safeguards do not involve political judgments by the IAEA as to the dependability or sincerity of nonproliferation commitments by other member states.

There also are clear limitations on how the IAEA can fulfill the specific tasks with which it is entrusted. The Agency does not have the power, for example, to demand plant shutdowns.

These points have often been cited as criticisms of the Agency, but these general limitations on the Agency's roles are simply facts of international relations, understood from the outset by all concerned. The safeguard system entails a unique compromise of sovereign rights by many nations, and it is certainly no surprise that this compromise is subject to specific limitations.

We must assure that IAEA safeguards do accomplish their defined role while pursuing other elements of nonproliferation policy, including intelligence efforts, security relationships, treaty commitments—in particular the NPT—restraint in the supply of sensitive nuclear material and technology, and upgrading national physical protection capabilities to deal with aspects of the problem that are not addressed by the IAEA safeguards.

As to the specific safeguards rights and activities of the IAEA and to the question of the Agency's effectiveness, I do not believe an abstract listing of limitations is the best approach to analysis or evaluation. Rather, I think we should ask the following questions:

Does the IAEA have an adequate legal basis for the application of effective safeguards?

Do the detailed arrangements reflect an appropriate balance of effectiveness of safeguards and protection of the valid economic, safety, and proprietary interests of the operators?

Does the Agency have the motivation, means, and capabilities to implement reasonably effective safeguards?

Does the political context in which IAEA safeguards operate allow the effective implementation of its inspection, analysis, and reporting functions?

I believe the answer to all of these questions is generally yes. But actual in-the-field application, while improving, is uneven and often falls short of what should, in principle, be done. It has taken sustained efforts by the United States and other interested countries to achieve the progress that has been made up to now, and to deal with the problems and weaknesses which need further work to improve the Agency's effectiveness and to keep pace with nuclear power developments.

The IAEA's task has been rapidly changing, both quantitatively and qualitatively. In recent years, IAEA safeguards have been applied to a rapidly increasing number of States and facilities. Perhaps more importantly, some of the safeguarded facilities have presented much more complex safeguards problems.

The U.S. effort in the safeguards area has had several main components. First, we have engaged in a concerted effort over several years to persuade the IAEA to design its safeguards approaches to counter specific diversion scenarios. We also have supported the establishment of safeguards detection goals in terms of quantities and times. Only with such goals can uniform and effective safeguards procedures be established. This effort has largely succeeded. The IAEA has adopted this diversion scenario orientation and a very demanding set of goals.

Second, we have pressed for more regular and self-critical analysis by the Agency Secretariat of inspection results. We believe this is crucial both to the identification of necessary improvements and to informative reporting by the IAEA to its Board of Governors. A major step in this connection was the establishment in the last few years of a competent internal evaluation unit and the preparation of an annual safeguards implementation report. This report provides extensive information on safeguards activities at specific facility types, on the degree of achievement of objectives, and on improvements that are needed. The Director General also has increased his specific reporting to the Board of Governors on matters of safeguards interests.

Third, we have supported a sharp increase in safeguards resources. The increase in safeguards staff has been rapid over the past several years, going from 100 in 1976 to 220 by 1981. The budget for safeguards has increased over that period from $6.4 million to $25 million.

Safeguards agreements, pursuant to the NPT, all closely follow an extensively negotiated model agreement. That agreement provides an adequate basis for safeguards application. It also provides provisions which deal with potential concerns of operators. The older guidelines for non-NPT-type agreements are less specific on many points, such as objectives of safeguards. These agreements do not limit inspection man-days. Some early agreements had deficiencies, such as inadequate provision with regard to the duration of the agreements. These deficiencies have been corrected in recent, non-NPT agreements, and we are satisfied that they too now provide adequate basis for safeguards application.

Under either type of safeguards agreement, more detailed safeguards arrangements are worked out for individual facilities. These, unlike the basic agreements, are not public documents. Our understanding is that provisions in these facility attachments, so-called, have evolved and improved over time. For example, older ones in some cases did not provide explicitly for the use of safeguards equipment, such as cameras. Parties to these early agreements have generally accepted that technical advances should be, must be, applied under existing agreements.

Based on our present understanding, recent and updated facility attachments are designed to address the relevant diversion scenarios, and do provide the IAEA with adequate rights and means to apply safeguards. For example, at several bulk handling facilities, continuous inspection is permitted under these agreements.

A measure of the adequacy of resources available is the comparison of inspection provisions in the facility attachments to actual implemented inspections. Of those inspection man-days provided in the facility attachments, only about 50 percent were implemented in the last year, due in large part to resource limitations. This is a situation which clearly needs improvement. The IAEA projects approximately 70 percent implementation in the next year or two. We strongly support efforts to that end, and I would say that that is by no means the extent to which we believe it should go. It should go to 100 percent, clearly.

The top management of the IAEA is highly competent and motivated, but there are many excellent and committed staff at all levels. As with any large organization, however, there can be improvements to assure against significant mistakes or omissions by staff in the conduct of inspections or analyses. It is important that adequate redundancies and cross-checks are built into the system. While more remains to be done, the IAEA is making progress in this regard. The establishment of the evaluation unit mentioned earlier is a case in point. We expect the new Director General to continue the improvements in IAEA efficiency and effectiveness.

The political context for IAEA safeguards also is critical. There are many considerations: the degree of cooperation from inspected states, vulnerability of individual inspectors to political pressure, and so on, which can raise a problem. Detailed discussion of each of these is not possible. Let me say, however, that the overall situation, in our judgment, with regard to such political factors is good. Inspected states generally are cooperative. In those cases where a state may not be cooperative, the Director General can have the confidence he will be backed by a large majority of the Board of Governors.

The Board plays a very important role in its policymaking, and its present size and composition allows effective functioning in this regard. The IAEA staff performs well in terms of reporting to the Board on difficulties encountered. The Secretariat also is able to resist pressure to dismiss individual inspectors, and thus to provide reasonable job security.

Differences between the developing and developed countries increasingly are evident at the IAEA. The G–77 countries are pressing for expansion of the Board of Governors, for increased technical assistance funded as regular budget, and for more hiring of individuals from developing countries for positions within the IAEA Secretariat. Where these countries can make a reasonable case for change, such as in more consideration of qualified individuals from these countries in IAEA appointments, I believe that we should be responsive. But we must make clear from the start our opposition to changes which would weaken the ability of the Agency to perform its functions. We have opposed, for example, the changing of current voluntary funding of technical assistance, and we will oppose any further expansion of the Board.

Not least, we need to resist the intrusion into IAEA of matters of extraneous political factors as occurred last September when the General Conference debated whether to suspend Israel from the Agency.

It is sometimes suggested that there is a contradiction between safeguards and "promotional" functions in the IAEA. I simply do not believe this is so. The IAEA is not an operator of activities which it safeguards, nor does it have an economic interest in them. Its "promotional" programs provide for basic information in areas such as reactor safety, waste management, and reactor siting, or they involve relatively modest technical assistance projects. These programs are one way of implementing article IV of the NPT, which committed the developed countries to aid developing ones in acquiring the benefits of nuclear energy. In the eyes of many of these developing countries, this IAEA participation and assistance is a necessary part of the broader nonproliferation bargain.

Mr. Chairman, President Reagan has made it clear that we strongly support the IAEA. We must continue to recognize the unique nature and contribution of this international body. We have taken various steps and plan to take still others to strengthen the Agency. Very important progress has been made by the Agency in the past, but it still confronts many problems, and important ones.

Our objective in support of the new Director General must be to make it as good and as effective an organization as possible, recognizing the continual need to do even better.

Thank you very much, Mr. Chairman, for your patience.

The CHAIRMAN. Thank you.

[Ambassador Kennedy's prepared statement follows:]

PREPARED STATEMENT OF HON. RICHARD T. KENNEDY

Mr. Chairman, it is a pleasure to appear before you today to discuss the International Atomic Energy Agency (IAEA) safeguards system. I particularly welcome this opportunity because of the interest and involvement of this committee in the nuclear non-proliferation problem. A careful examination of this subject is especially timely.

I will briefly cover the nature of IAEA safeguards and their role in the non-proliferation regime. I will also briefly discuss the effectiveness of these safeguards, and will outline the continuing work underway to improve them.

It is important at the outset to understand what IAEA safeguards are and what they are not. They are a system of procedures including records, reports, and inspections, by which the IAEA can verify that specified material and facilities are not being diverted from their declared peaceful purposes. IAEA safeguards are a critical and indispensible component of the worldwide non-proliferation effort. But they are not the totality of that effort.

IAEA safeguards are principally a detection and warning rather than a prevention or reaction mechanism. The IAEA has no capability to physically prevent diversion and has limited enforcement authority. The IAEA has no authority or capability to search for nuclear activities away from defined locations. And IAEA safeguards do not involve political judgements by the IAEA as to the dependability or sincerity of non-proliferation commitments.

There also are clear limitations on how the IAEA can fulfill the specific tasks with which it is entrusted. The Agency does not have power, for example, to demand plant shutdowns. The Agency's rights on a range of specific questions (such as designation of inspectors) are subject to limitations. Substantial amounts of information received or collected by the IAEA are classified and thus not publicly releaseable by the IAEA.

These points have sometimes been cited as criticisms of the IAEA. However, the general limitations on the Agency's role are simply facts of international relations, understood from the outset by all concerned. The IAEA safeguards system entails a unique compromise of sovereign rights by many nations, and it is certainly no surprise that this compromise is subject to specific limitations. We must assure that IAEA safeguards do accomplish their defined role, while pursuing other elements of non-proliferation policy such as intelligence efforts, security relationships, treaty commitments (particularly the NPT), restraint in supply of sensitive nuclear material and technology, and upgrading national physical protection capabilities, to deal with aspects of the problem not addressed by IAEA safeguards.

With regard to the specific safeguards rights and activities of the IAEA and to the question of the Agency's effectiveness, I do not believe an abstract listing of limitations is the best approach to analysis or evaluation. Rather we should ask the following questions:

Does the IAEA have an adequate legal basis for application of effective safeguards?

Do the detailed arrangements reflect an appropriate balance of effectiveness of safeguards and protection of the valid economic, safety, and proprietary interests of the operators?

Does the IAEA have the motivation, means, and capabilities to implement reasonably effective safeguards?

Does the political context in which IAEA safeguards operate allow the effective implementation of its inspection, analysis, and reporting functions?

I believe the answer to all these questions is generally yes. But actual in-the-field application, while improving, is uneven and often falls short of what should, in principle, be done. It has taken sustained efforts by the United States and other interested countries to achieve the progress to date; and there are problems and weaknesses which need further work to improve the agency's effectiveness and to keep pace with nuclear power developments.

A careful analysis of each of the above questions, a presentation of the reasoning behind our generally, positive conclusion, and a complete listing of necessary improvements is beyond the scope of my remarks here. But I would like to present some of the relevant background and considerations.

The IAEA's task has been rapidly changing, both quantitatively and qualitatively. IAEA safeguards were initially, applied mainly to research reactors, then to an increasing number of power reactors. The safeguards task in the case or research reactors and light water moderated power reactors was relatively straightforward: The counting and identification of a modest number of discrete fuel elements. Also, exact technical standards for safeguards were not provided.

In recent years, IAEA safeguards have been applied to a rapidly increasing number of states and facilities. Perhaps more importantly, some of the safeguarded facilities have presented a much more complex safeguards problem. Large amounts of material in various forms are present in or flow through "bulk handling" facilities. In particular, fuel fabrication, reprocessing, and enrichment plants pose substantial challenges for IAEA safeguards. Also, on-line refueled power reactors pose more complex safeguards problems than do other types, because of continuous fuel movements. The political context of safeguards has in some ways also become more sensitive, particularly, with the spread of significant nuclear facilities to regions of possible proliferation risk.

The U.S. effort in the safeguards area has had several main components. First, we have engaged in a concerted effort over several years to persuade the IAEA to design its safeguards approaches to counter specific diversion scenarios. We also have supported the establishment of safeguards detection goals, in terms of quantities and times. Only with such goals can uniform and effective safeguards procedures be established. This effort has largely succeeded. The IAEA has adopted this diversion-scenario orientation, and a very demanding set of goals. These goals are to some degree arbitrary and are not accepted (or even appropriate) as formal requirements. But their use represents clear progress in the IAEA's concept of its task.

Second, we have pressed for more regular and self-critical analysis by the Agency secretariat of inspection results. We believe this is crucial both to identification of necessary improvements and to informative reporting by the IAEA to its Board of Governors. A major step in this connection was the establishment, in the last few years, of a highly competent internal evaluation unit, and the preparation of an annual safeguards implementation report. This report provides extensive information on safeguards activities at specific facility types, on the degree of achievement of objectives, and on improvements needed. The Director General also has increased his specific reporting to the Board of Governors on matters of safeguards interest.

Third, we have supported a sharp increase in safeguards resources. The increase in the safeguards staff has been very rapid over the last several years, going from 100 in 1976 to 220 in 1981. The budget for safeguards has increased from $6.4 million to $25 million in that period. An extensive U.S. program of technical support to the IAEA is now paying off in the procurement and field use of some 10 types of safeguards instruments, as well as in the application of various systems studies, data handling systems and standardization efforts. This U.S. support program has helped to induce several other countries, including the United Kingdom, Germany, Canada, and the Soviet Union, to institute similar measures.

Other elements of our effort have included support for appointment of competent and highly motivated staff. In this connection, we are pleased that the IAEA has recently appointed an extremely capable Director General, Mr. Hans Blix of Sweden, to succeed the long time distinguished Director General Dr. Sigvard Eklund. The United States also makes Diplomatic approaches to encourage other countries to increase their support of effective IAEA safeguards.

Turning to whether IAEA safeguards agreements provide an adequate basis for effective safeguards exists, some further background is relevant. When cooperation in peaceful nuclear power started in a serious way in the late 1950's, the United States made extensive supply arrangements which provided us rights to inspect the supplied items to assure that they had not been diverted from peaceful purposes. The IAEA was established in 1957 and empowered to apply safeguards to items supplied through it and in other cases as requested. The IAEA's safeguards rights and responsibilities are not set out in a single world-wide instrument but are established under agreements between individual states and the IAEA. These can be either trilateral agreements (a supplier, a recipient, and the IAEA) or bilateral agreements, involving only the inspected state and the IAEA. Since the entry into force of the Non-Proliferation Treaty, over 100 states have concluded bilateral safeguards agreements with the IAEA covering all nuclear activities in the state.

Safeguards agreements pursuant to the NPT all closely follow an extensively negotiated model agreement. It provides an adequate basis for safeguards application. It also provides various provisions which deal with potential concerns of operators. The older guidelines for non-NPT type agreements are less specific on many points such as objectives of safeguards. These agreements do not limit inspection man-days. Some early agreements had deficiencies such as inadequate provisions with regard to duration of the agreement. Such deficiencies have been corrected in recent non-NPT agreements, and we are satisfied that they too provide an adequate basis for safeguards application.

Under either type of safeguards agreement more detailed safeguards arrangements are worked out for individual facilities. These, unlike the basic agreements, are not public documents. Our understanding is that provisions in these "facility attachments" have evolved and improved over time. For example, older ones in some cases did not provide explicitly for use of safeguards equipment such as cameras. But parties to these early agreements have generally accepted that technical advances should be applied under existing agreements. Also, these documents can be amended by the state and IAEA; and the IAEA frequently requests such updating. We believe that this updating has had considerable success. Nevertheless improvement of some old arrangements still is necessary. Based on our present understanding, recent and updated facility attachments are designed to address the relevant diversion scenarios and do provide the IAEA with adequate rights and means to apply safeguards. For example, at several bulk handling facilities continuous inspection is permitted.

Some perspective is necessary in reacting to certain recent criticisms of the legal provisions in the IAEA system. For example, the fact that inspected states must agree to the designation of individual inspectors has been presented as a major defect. We do not believe this is the case. Operators or inspected states have a legitimate interest in being able to avoid the designation of individuals objectionable to them, for example for physical security reasons. In fact, the U.S. Senate considered this provision to be an important protection for the United States under our own safeguards agreement with the IAEA. Safeguards agreements also contain a provision protecting against overuse of the right to refuse designation of an inspector. In practice, designation of inspectors, has not been a widespread or serious problem to the IAEA, and has not prevented inspections of any state or facility. However, the Director General has reported to the board that delays in acceptance of inspectors in some instances have complicated the IAEA's task by preventing optimal use of manpower.

With regard to the motivation, resources, and capability of the IAEA to apply effective safeguards, I have outlined the increases in staff and budget. A measure of the adequacy of the resources available is the comparison of inspection provisions in facility attachments to actual implemented inspections. Of those inspection man-days provided in the facility attachments, only about 50 percent have been implemented in the last year due in large part to resource limitations. This is a situation clearly needing improvement. The IAEA projects approximately 70 percent implementation in the next year or two, and we strongly support efforts toward that end.

The top management of the IAEA is highly competent and motivated, and there are many excellent and committed staff at all levels. But as with any large organization, there can be improvements to assure against significant mistakes or omissions by staff in the conduct of inspections and analyses it is important that adequate redundancies and crosschecks are built into the system. While more remains to be done, the IAEA is making progress in this regard. The establishment of the evaluation unit mentioned earlier is a case in point. We expect the new Director General to continue the improvements of IAEA efficiency and effectiveness.

The political context for IAEA safeguards also is critical. There are many considerations such as degree of cooperation from inspected states, any vulnerability of individual inspectors to political pressure, ability of IAEA management resist possible pressure from inspected states on specific points, and general support of safeguards functions by the Board of Governors. Detailed discussion of each of these factors is not possible in the time available. The overall situation with regard to such factors, however, is good. Inspected states, for example, generally are quite cooperative. In those cases where a state may not be cooperative, the Director General can have confidence he will be backed by a large majority of the Board of Governors. The Board plays a very important role in policymaking, and its present size and composition allows effective functioning in this regard. And the IAEA staff performs well in terms of reporting to the Board on difficulties encountered. The IAEA Secretariat also is able to resist pressure to dismiss individual inspectors, and thus to provide reasonable job security.

Differences between the developing and developed countries increasingly are evident in the IAEA. The G-77 countries are pressing for expansion of the Board of Governors, increased technical assistance funded as a regular budget item, and more hiring of individuals from developing countries for positions within the IAEA Secretariat. Where the developing countries can make a reasonble case for change, such as in more consideration of qualified individuals from these countries in IAEA appointments, I believe we should be responsive. But we must also make clear from the start our opposition to changes which would weaken the IAEA's ability to perform its functions. We have opposed changing current voluntary funding of technical assistance and we have opposed any further expansion of the Board.

Not least we need to resist the intrusion into IAEA matters of extraneous political factors, as occurred last September when the general conference debated whether to suspend Israel from the IAEA. Such politicization ultimately could threaten the ability of the IAEA to perform its tasks, and especially its vital safeguard mission. For now, however, these disputes have not undermined safeguards and we are guardedly optimistic that a large majority of IAEA member states will continue to recognize that an effective IAEA is in their own security interest and is an indispensible requirement for the expanded international nuclear commerce many of them seek.

It sometimes is suggested that there is a contradiction between the safeguards and "promotional" functions of the IAEA. I do not believe this so. The IAEA is not an operator of activities which it safeguards; nor does it have an economic interest in them. The IAEA's "promotional" programs provide basic information in areas such as reactor safety, waste management, or reactor siting or involve relatively modest technical assistance projects. These IAEA programs are one way of implementing article IV of the nuclear Non-Proliferation Treaty which committed the developed countries to aid the developing ones in acquiring the benefits of nuclear energy. In the eyes of many of these developing countries such IAEA participation and assistance, therefore, is a necessary part of the broader non-proliferation bargain. Thus, rather than weakening the safeguards system, so-called "promotional" programs help to maintain the global political support that the system assumes.

Mr. Chairman, President Reagan has made clear that we strongly support the IAEA. We must continue to recognize the unique nature and contribution of this international body. We have taken various steps and plan to take still others to strengthen the Agency. And very important progress has been made by the IAEA in the recent past. But the IAEA still confronts important problems. Our objective, in support of the new Director General, must be to make it as good and effective an organization as possible, recognizing the continual need to do even better. I warmly welcome the past and present interest of this committee in IAEA safeguards, and will work closely with you in the continued support and further improvement of this essential element of our non-proliferation effort.

The CHAIRMAN. Thank you very much.

We will proceed on the 10 minute rule if your time will allow that.

Ambassador KENNEDY. Yes, sir.

The CHAIRMAN. I would like to begin with the principal concern that many of us have, that despite the IAEA, despite U.S. policy, despite concerns even in the Soviet Union—and they have done very little to encourage the spread of nuclear technology, even among their own satellite countries—despite all of this, our main concern is that the nuclear club is spreading, and getting larger, and threatening to get considerably larger.

What do you perceive, Secretary Kennedy, as the role of IAEA, and what is our role in trying to prevent the club from spreading and getting larger? What can they do? What can IAEA do about that?

Ambassador KENNEDY. Mr. Chairman, the strength of the Agency, it seems to me, rests very largely on the commitment of the member states to what is in effect a surrendering of a part of national sovereignty, to committing a nation to permit the Agency to inspect its facilities, in a sense, therefore, to verify what the country says it is doing vis-a-vis its inherent responsibilities under the NPT.

Now, what the IAEA can do, it seems to me, is through enhanced safeguards means—and there is no doubt in my mind that enhanced safeguards means are essential, and there are steps which can and must be taken—through enhanced safeguards means to assure that diversion can and will be detected in a timely manner. This is possible. Indeed, I submit that it is highly likely in all installations of which I am aware where the IAEA is now functioning that this would result. Remember, this is not to prevent it, but rather, to detect it.

The principle from the beginning has been that detection of diversion and the international opprobrium that would result would be a substantial deterrent. We have only to hope that that fact is true.

A potential diverter needs to understand that he will become in a sense a pariah in the international community at least. I think that has been the general view. I think it will continue. The Agency can contribute to making certain that this is done.

The Agency also can encourage countries to take steps in design of facilities to make them more safeguardable from the outset, a most important consideration. This is something that is being done today that was not being done in early days.

The CHAIRMAN. Thank you very much.

This morning you probably noticed an article on the editorial page by Jessica Tuchman Mathews entitled "Letting Nuclear Danger Spread," in the Washington Post. It is a resounding condemnation of the nonproliferation policy of the administration, indicating that we have all but wiped out American nonproliferation policy.

She indicates that she did have a hand in formulating that policy during part of the Carter administration, and I would like to just read you two sentences with respect to Pakistan. "Leverage is only leverage if one is prepared to use it. The administration's easy acceptance of Pakistan's nuclear bomb program and many subsequent decisions signaled clearly that it was more interested in encouraging nuclear trade."

Now, that is inconsistent with all the conversations I have had with members of the administration about the concern about Pakistan. There has been a deep concern. I have never heard uttered once the fact that we need trade, not once by anyone in the administration, dozens of people. But I think you should possibly answer it because there is a perception that we do not have a tough policy on nuclear nonproliferation, and John Glenn and I and every member of this committee would want this administration in a nonpartisan sense to follow a very tough policy on nonproliferation, just as tough as we have been with the air controllers and everyone else that we have toughed it out with, including Congress. This is the most important single problem that we will face, and the fact that the President said that in his remarkable October 2 declaration when he talked about theater nuclear weaponry is evidence that the policy of the administration is nonproliferation, is to reduce, reduce substantially nuclear strategic weapons.

Now, as the spokesmen for the administration from the State Department standpoint in this regard, can you then answer this charge this morning in the Washington Post that you are soft on nonproliferation?

Ambassador **Kennedy**. Nothing could be farther from the truth, Mr. Chairman. I saw that sentence and I was shocked by it because, as I say, nothing could be further from the truth. You stated it well. Everyone in the administration with whom I am even remotely acquainted would take exception to the statement that we are in any sense soft on the question of nuclear weapons or nuclear explosions in Pakistan. That is absolutely not true.

Let me just go on from there to say that, whereas the policy may be a somewhat different one in its basic shape than that of the preceding administration, it is so because it is trying to find a way which will more effectively deal with the question. One difficulty which we experienced with the previous policy was that it was essentially an undifferentiated one. It treated those who had fairly good records not all that differently than those whose records were somewhat more suspect. It was believed that a more effective policy—a better result—might be achieved by a policy which dealt with situations on a more case-by-case basis. In other words, look at the situation and deal with it in ways calculated to get the result that you particularly want in the particular case.

That is precisely what is being done. One of the critical means is dealing with the question, the whole nonproliferation question in the context of national security, not just as an issue by itself separate from other issues of security.

The **Chairman**. Thank you.

One last question. Considering the U.S.-U.S.S.R. nuclear arms control negotiations that are now underway and considering that verification will be an important part of these negotiations, of what value in your judgment are IAEA safeguards as a model or a precedent for international inspection to verify arms control commitments?

Ambassador **Kennedy**. As I mentioned in my statement, they do represent a model in the general sense that there is a commitment on the part of all nations to allow inspections by international bodies, in effect to give up some of their own sovereign rights. This may provide at least an example.

Also, there are in the IAEA surveillance system a variety of surveillance techniques, some of which may have some merit and be of some use in the context of other verification systems.

The **Chairman**. Thank you very much.

Senator Biden?

Senator **Biden**. Thank you very much, Mr. Chairman.

Mr. Ambassador, sometimes in politics, domestic and international alike, and I suspect sometimes in the area of nonproliferation, what is apparent is more important than what is real, and I think it would be very difficult to deny that there is the appearance that there has been a softening of our commitment of nonproliferation. Whether or not that is true—and I will not make that argument at this point—there is a consensus among the European leaders with whom I speak, and with the other persons from around the world who wander through this committee, that there has not only been a change in policy, but the result has been less of a commitment to nonproliferation.

Now, having said that—and that is my characterization, I understand, not yours—I wonder whether or not you could tell us whether, when the President announced that the policy would be to become a reliable supplier, the rationale for that shift in being a reliable supplier is that it would be a different means or a slightly different in emphasis means by which the United States would be able to exercise leverage, but that leverage, as was at least implicit in the article, is only as good as it is exercised when an occasion presents itself.

Now, here we are in the situation with Iraq, as the article this morning points out, where the only issue within the Agency—not the only, the most celebrated discussion within the Agency—and among our nuclear partners in the world, was how rapidly we can get Iraq back on its feet, rather than why is Iraq stockpiling.

Second, with regard to Pakistan, we are in a situation where it is awfully clear what Pakistan is about now. I mean, it would be absolutely naive in the extreme to suggest that Pakistan had any other intention than to produce a nuclear capability, a bomb.

And here we are with Mexico telling the world we want to get in the business, but we want to have the highest technology and we want to be able to move on. I do not see how anyone who is realistic cannot understand what they are talking about.

Now, with all that going on—this is a very long preface, the only question I am going to ask you—with all that going on, we are in a situation where to the best of my knowledge the administration has not tried to put the arm on the French at all in their activities in South Africa or anywhere else around the world. To the best of my knowledge, the issue has not been raised to the level of international significance by the President, as it only can be. It can't be by anyone else. Unless the President of the United States says this is it, this is important and we do not like what is going on, all the yelling in the world in Congress will not make any difference.

Why, if the policy is based upon being a reliable supplier to exercise leverage, and if we are a needed component, as the administration points out every opportunity it gets among our West European friend, that they need us more than we need them, as Arthur Burn's speech implied 2 days ago in Germany, why is it that we have not exercised the leverage?

Ambassador **Kennedy**. Senator, I think I would have to suggest I do not quite agree with the premise that we have not.

Senator **Biden**. Well tell me how we have.

Ambassador **Kennedy**. Let me say that as to our West European friends, and our friends in Japan as well, where there are special relationships, there have been ongoing discussions of how we might improve the rules of nuclear commerce and tighten them up.

Senator **Biden**. Mr. Ambassador, let me be very blunt with you. When the French, the Germans, and the British decided what positions they were going to take with regard to grain embargoes or with regard to certain aspects of United States-Soviet relations, and consequently commenting on them, we were not at all hesitant to twist arms, make demands, be very clear. I am not talking about any State Departmentese here, you know, the diplomatic language. Why in the devil have we not said to the French, forget all the organizations, just bilaterally to the French, "what are you doing, and you had better stop it or we are going to have a real breach in our relationship?"

Why do we say to the Japanese—to the best of my knowledge, and I am not the expert like my colleagues are on this committee—I understand there is really no way that we can ever effectively safeguard reprocessing plants. Why in the devil are we doing what we are doing with the Japanese? I mean, why aren't we saying, bang—we say it other places. The President is the most macho President I have ever seen. He stands up there and he just belts it out. He belts it out whether or not it is troops in Europe, whether or not it is a gas pipline deal—whatever it is, lets it be known, and he has not said anything on this, anything. I have not heard a word. I have not heard it in one of those press conferences.

You say this is a big deal, this is really important. The world is going to hell in a handbasket on this issue, and I have not heard him stand up and be specific on any of these issues.

Ambassador **Kennedy**. Senator, he did issue a nonproliferation statement.

Senator **Biden**. Yes; but what did he say? He talked about more safeguards, he talked about having to get together, make Europe—I mean, that is not his style. When he wants to do something, he just does it straight up. He is not a State Department type. [General laughter.]

I am serious, and I say that as a compliment to him. [Ceneral laughter.]

I truly believe this has not been brought up on his scope. I truly believe it is not one of those things that has risen to the level of his personal attention.

Ambassador **Kennedy**. Senator, may I just say that I think that is an incorrect perception.

Senator **Biden**. A what, an incorrect——

Ambassador **Kennedy**. I think it is an incorrect perception.

Senator **Biden**. I thought you might.

Ambassador **Kennedy**. It is there. The President has made it very clear that he considers this a very serious matter indeed, and one that has to be—the situation must be improved.

Senator **Biden**. Do you think there is any pressure on this administration from the nuclear establishment in this country to not be as tough as you and I might like him to be?

Ambassador **Kennedy**. On safeguards?

Senator **Biden**. When you say safeguards, I want to expand the concept of safeguards.

Ambassador **Kennedy**. Nonproliferation?

Senator **Biden**. Nonproliferation.

Ambassador **Kennedy**. No, sir, I do not.

Senator **Biden**. You do not.

Ambassador **Kennedy**. Let me say that my own impression of the nuclear community is that if it has any sense—and that is for everybody to decide himself, I suppose—but if it has any sense, it has to recognize its future will depend upon an effective means of assuring a sound nonproliferation regime around the world. It will not survive without it.

Senator **Biden**. Ambassador Kennedy, you are older and wiser than I, but I think that is a relatively naive statement to make because I have never found, whether it is a labor union or Westinghouse Corp., or any corporation in America, to view anything in the long term, never. I have never seen them ever suggest that they would forgo a multibillion dollar deal because 10 years later we may all be blown away. I have never seen that, and I have only been here 9 years, but I would challenge you to point out to me when, ever, in your experience you have seen a corporation, a company, a labor union, anyone who stands to benefit in those numbers, deny their ability to benefit because they know that down the road 2, 5, 10, or 20 years they may all be gone. That is not the nature of the beast.

I am not criticizing them. You know, it is all bottom line management. I don't know any board of directors or any chairman of the board who will go before his board and say, you know, we have an opportunity to have $2, $3, $4 or $5 billion deal with South Africa, Mexico, anywhere, Pakistan, but let me tell you something, it is bad policy because I think they may be wanting to make a bomb. IAEA has not, because of international difficulties, has not been able to really follow this very long, have not been able to prevent it, it is not designed to prevent it, it is just designed to blow a whistler, and therefore we should not go ahead and do this.

Ambassador **Kennedy**. Senator, I would have to say to you that I am not here as a defender of the industry.

Senator **Biden**. I know that. And I am not here just criticizing the industry alone.

Ambassador **Kennedy**. Let me say that I think that were they to make a decision of the kind that you have described, it would be irresponsible. I do not credit the American industry, the one we are talking about, with irresponsibility in the national interest.

Senator **Biden**. Let me sum it all up by saying that I remember back in the first oil embargo when there were a number of people very critical about the question of the delay that took place in refueling our fleets and making oil available from our multinational corporations, which is a contradiction in terms, and I think all the people in my State expected me to get up and just band away at that. I got up on the floor of the Senate and pointed out, I think it is ridiculous to criticize a multinational oil company for doing something that is not in their interests. They are not a government. It is not their responsibility to make that kind of judgment. They are business people. It is the responsibility of Presidents, Congresses, and elected officials to impose upon them what is the national will, the national best interest, and I am not making any perjorative statement about these folks being bad. I just think we, if we except them to police themselves, if we expect them to act in the national interest and we merely monitor it, I think we are making a tragic mistake, and I do not see any real impetus coming from this administration that would lead me to believe that they plan on and/or are prepared to exercise the leverage that they say they have redesigned in order to better safeguard the world in nonproliferation.

Ambassador **Kennedy**. Senator, that is exactly what we are doing. The industry is not making export policy; the administration is.

Senator **Biden**. That's the point.

OK. Well, thank you very much.

Senator **Glenn**. Thank you. We are going to have to go vote shortly. Let me get in a couple of questions very quickly. Also, I have an amendment on the floor, and I will try to come back as soon as possible after that. If not, I will submit some questions to you later on.

I thought the Tuchman article this morning was very good because it expresses what I have viewed as what has been going on. The only thing I would take issue with, I think, is its statement concerning the first pulling back from our nonproliferation policy, which the article says occurred in this administration; to my view, this occurred in the last——

Ambassador **Kennedy**. Correct.

Senator **Glenn** [continuing]. With the sale to India. I think that the article was inaccurate on this point. Ms. Tuchman, now Ms. Mathews, was out of the administration by that time when the sale to India occurred. We fought that one tooth and nail on the Senate floor, as you probably recall, and lost 48 to 46 at that time. So my observations on our backing away from our nonproliferation policy are bipartisanly critical in this particular area, as they have been for a long time.

I think our new policy is to have no policy, as I see it. I think we have given in twice when push came to shove. The Reagan administration opposed as strongly as they could my amendment on the floor. Their position was that even if Pakistan explodes a bomb, that we still won't necessarily cut off assistance; we still will continue our aid programs. My amendment passed 51 to 45 on the Senate floor a few weeks ago, but it was opposed very strongly by the administration. So I think that what we see going on is a dismantling of our tough and generally consistent policy of the past into a policy of taking up each item just as it happens to come along. We will have a policy of exigencies of the moment instead of a solid, long-term policy as I see it.

The article in the Post this morning indicated that we are now apparently also considering whether India should be allowed to reprocess U.S. fuel. And as I said before in my opening statement, reprocessing and enrichment are the two methods to nuclear weaponry. India already has had capability in the past, but we apparently are even going to consider going along and cooperating even further now just to prevent the cancellation of our fuel contract.

Is that being considered actively at the present time?

Ambassador **KENNEDY**. Senator, the question is not a cancellation of our fuel contract. The question is attempting to work out some arrangement with the Indians which will enable us to retain safeguards in India. It is pursuing precisely the policy which I believe we both agree should be pursued, that is, to get safeguards extended as far as they can be extended, and retain them, and enforce them.

Senator **GLENN**. I only have about another minute or two, and then I am going to have to run to vote because we have our five lights back here, but do you agree that the technical objectives of IAEA are reasonable objectives?

Ambassador **KENNEDY**. The objectives?

Senator **GLENN**. Yes.

Ambassador **KENNEDY**. Yes, sir, I do.

Senator **GLENN**. A statement in the Battelle report says that "given the conditions and assumptions under which IAEA safeguards are being implemented at the present time, the technical objectives are not generally attainable, although they may be attained in some instances."

Would you agree with that?

Ambassador **KENNEDY**. I think that is correct. As I indicated in my own statement, the problem has been a matter of resources.

Senator **GLENN**. You agree that these objectives are not generally attainable now?

Ambassador **KENNDY**. That is correct, with the level of resources that we have now. Now, that does not say that that represents a condemning deficiency. It represents a situation which needs to be worked on and corrected, precisely what we have been trying to do with an increase in resources from all sources to the Agency.

Senator **GLENN**. Battelle also says that to achieve these technical objectives will require the development and deployment into routine use of a wide range of advanced technology and equipment. It would have to be carried out over a number of years, and would likely cost $20 million to $30 million in research and development.

In light of these requirements, can you tell me what has happened to the level of U.S. technical support for IAEA over the last 2 years?

To save time, I will give you the figures I have that indicate we have reduced our support from $5.6 million down to $4 million in this very critical area.

Is that correct?

Ambassador **KENNEDY**. It is about $4.1 million in 1982.

Senator **GLENN**. Down from $5.6 million.

Ambassador **KENNEDY**. And about $4.5 million scheduled for 1983.

Senator **GLENN**. For 1983. Is that down from the $5.6 million earlier?

Ambassador **KENNEDY**. I do not know what the $5.6 million was.

Now, the total of support, including all agencies of the Government in 1982 will be about $10 million, and a little bit more than that in 1983.

Senator GLENN. I am going to have to run. I will get back if I can. I have an amendment on the floor, as I said.

The Chairman is back now. We will submit questions later if I do not get back.

Ambassador KENNEDY. Yes, sir.

Senator GLENN. Thank you very much.

The CHAIRMAN. Thank you, Senator Glenn, and in your case and the case of other Senators, we will incorporate the questions in the record and keep the record open long enough, Secretary Kennedy, for you to answer them.

I would like to pursue a little bit more how important you feel safeguards are for the success of U.S. policy to confine the further spread of nuclear weaponry.

Ambassador KENNEDY. They are an indispensable part of a total program which involves diplomatic efforts, national security efforts, international security efforts, and relationships with other suppliers. But the safeguards regime is an indispensable part.

The CHAIRMAN. You have mentioned in your testimony the increased financing and funding that has been provided.

What are the prospects of getting the necessary political and technical and financial support from member states to improve present safeguards?

Ambassador KENNEDY. We are making a major effort, Senator, to get enhanced contributions from other nations, while at the same time continuing our own reasonably high level of contributions. We also are attempting to get other states to encourage the enlistment of high quality safeguards personnel.

The CHAIRMAN. We have overlapping jurisdiction sometimes in the Congress, and we have tried in this area to sharply define our respective roles.

Which Federal agency has the lead responsibility for U.S. policy to strengthen IAEA safeguards? Is there a regular group that does pull together and coordinate administration efforts?

Ambassador KENNEDY. Yes, sir, the Department of State is primarily responsible, but technical assistance is provided through the Department of Energy and also through the IAEA. The NRC also makes contributions in this regard.

The CHAIRMAN. Thank you.

What are the alternatives to safeguards? What other routes can we follow if we cannot rely entirely, as we cannot, on safeguards, and what are the alternatives to IAEA as a provider of safeguards?

Ambassador KENNEDY. Mr. Chairman, I do not think there are any real alternatives to safeguards. What has to be done is a safeguards regime has to be assured which is going to give us the kind of assurance against diversion that we are looking for.

But as to the IAEA, one could certainly say that in extremes one could fall back to a series of bilateral arrangements. One could devise presumably other regional arrangements, but I would have to say that I would doubt that one could today enact a statute which would provide the range of authorities and convey those authorities by national member states to an international body that the statute of the IAEA now has.

So, while I would not for a second say that were the Agency to clearly reach a point where it was unable and would be unable to meet its objectives and meet the requirements of the statute, that we should not think about other things, it would be only in that circumstance, I believe, that we should do that. What we need to do is concentrate on strengthening the Agency, steps which have been underway with strong support from the Congress over the past 3 or 4 years ought to be pressed harder.

There is a resource problem, but it is not only a resource problem. There are organizational questions. These can be dealt with and are being dealt with in the Agency. It is to our advantage to continue to press those. We have discussed these matters with the incoming, the new Director General Mr. Blix. He understands our view on this, and he understands as well that we stand ready to help him.

The CHAIRMAN. I would like to touch back on Pakistan briefly to ask what progress the administration is making in negotiations or discussions with Pakistan to upgrade surveillance and other safeguard measures there.

Ambassador KENNEDY. Well, those discussions are not by the administration. Discussions are going on between Pakistan and the IAEA.

The CHAIRMAN. There are no discussions between the administration and Pakistan?

Ambassador KENNEDY. Oh, yes, indeed. I did not mean to suggest we were not having discussions with Pakistan.

The CHAIRMAN. That is the whole premise on which I supported our program.

Ambassador KENNEDY. Oh, no. What I am suggesting is that as to specific surveillance matters and this sort of thing, those discussions are being conducted by the agency, and I think we can report progress.

The CHAIRMAN. Right.

Is the Agency making any real progress, in your judgment, Secretary Kennedy?

Ambassador KENNEDY. Yes, sir, it is. There is more to be done, but progress is being made.

The CHAIRMAN. But they are making progress.

Ambassador KENNEDY. Yes, sir.

Let me just add to that, Senator, I did not mean to imply that we were not engaging in discussions with the Pakistanis on a regular basis. Of course, we are.

The CHAIRMAN. Right.

Ambassador KENNEDY. But we do not want to get in between Pakistan and the Agency, obviously.

The CHAIRMAN. What significance do you place on the Agency's recent report that it may not be able to reliably safeguard certain Pakistani nuclear facilities?

Ambassador KENNEDY. I do not recall that it made a statement of precisely that character. I think it spoke of certain types of reactors, in particular, the on-line refueling systems. The KANUPP system which Pakistan has is one of those. There are others like it, and the Agency, the Director General has directed the Agency to apply improved safeguards to all of those systems.

I think the concern is getting the kinds of surveillance systems that are necessary into all of those reactors and working that out with the member states who are operating those facilities. The Agency is working to precisely that end, and is in fact making substantial progress in a number of the countries involved.

The CHAIRMAN. Thank you.

Just a question or two on the safeguards for commercial plutonium. I have been very concerned about the possible commercial use of plutonium in this country.

What is the present capability of the Agency to safeguard a plutonium economy?

Ambassador KENNEDY. A total plutonium economy?

The CHAIRMAN. A plutonium economy; yes.

Ambassador KENNEDY. I would suggest, Senator, that I do not think at this point the Agency would be in a position to deal with a worldwide total plutonium economy, nor do I think there is going to be any such economy.

If some sort of a situation of that kind were to eventuate, the Agency would obviously have to be geared to deal with it. That would take some time, both as to determining what would be necessary—for example, transportation questions would be involved—what would be necessary to handle these questions, and then to be sure that the resourses were available.

Let me say that as to the core problem of a plutonium economy, the reprocessing system, as I indicated in my statement, in a number of instances where these matters have been taken up by the Agency, the Agency has been granted by the countries involved what amounts to the right of continuous and full time inspection of reprocessing plants. To assure against potential diversion, a system of that kind probably would be essential, in addition to a lot of surveillance techniques and equipment.

The CHAIRMAN. With respect to safeguards also, there has been some discussion; some U.S. analysts have proposed that IAEA inspectors should have unrestricted right to enter or inspect any nuclear facility, whether or not listed in agreements between an inspected country and the Agency.

Could you give us the pros and the cons of such a right, and does the administration have any position on that?

Ambassador KENNEDY. I don't think the administration has a position on the question. Let me just say that certainly were it possible to get an agreement with a country to permit that, it would obviously be of additional help. On the other hand, the agreements do not so provide, and to negotiate them might be extremely difficult. I wonder what the cost of so doing might be.

In some instances I would have to say that countries have been cooperative—and I mention the example of Iraq. Someone referred to the fact that Iraq had not allowed inspection of its natural uranium stocks. In fact, they are not required to do so. They are not normally inspected. They are not safeguardable as a general rule. However, my understanding is that at the last inspection by the IAEA inspectors of the Iraq facilities a very few weeks ago, Iraq voluntarily asked the inspectors to take a look at these facilities.

Now, it seems to me it is that kind of cooperative approach that we seek where there is a climate of mutual trust. If the IAEA safeguards system functions in a climate in which all parties believe the system is in their interest, I think we will get the best results.

The CHAIRMAN. Before I yield to Senator Cranston, just one last question because of the urgency of the timing on it.

Senator Glenn and I will cosponsor a sense of the Congress resolution today as an amendment to the DOD appropriation bill that we are voting on this afternoon—the resolution states our intention to abide by the SALT II agreement. In a sense I have just simply drawn upon the testimony by Secretary Haig and Secretary Weinberger, and the fact that we will not in our strategic program, as outlined by the President on October 2, do anything that will contravene the SALT II Treaty. Even though we do not have it in effect and it has not been ratified, we will not at this time, so long as the Soviets do not breach the provisions of that treaty, undertake to do anything in contravention of the treaty. All the resolution does, anything in effect, is support the administration position on this issue.

We would like to get a position by the administration on that; maybe you could give it to me now or call back this afternoon. I would appreciate knowing what the administration attitude would be on incorporating that.

Ambassador KENNEDY. I will have to get you a view this afternoon.

The CHAIRMAN. I would appreciate that very much.

Senator Cranston.

Senator CRANSTON. Thank you very much.

I will be very brief because I know we are getting behind and have a number of other witnesses.

Is it the administration's view, Ambassador, that the independent NRC is correct in concluding unanimously as it did in Friday's letter to Congress that the IAEA safegurad system would not detect a diversion in at least some types of facilities?

Ambassador KENNEDY. Senator, I do not want to comment, if I could be excused from doing so, on the NRC letter, for the reason that we received the letter rather late, I am sorry to say, inadvertently, but more importantly, we have not had a chance—I do not know precisely the grounds on which they have reached these conclusions.

Senator CRANSTON. Would you then reply in writing to that question after you have had time to consider it?

Ambassador KENNEDY. Yes, sir, I certainly will. I want to consult, and I tell you that I have initiated an attempt to get together with the Chairman of the Commission to discuss precisely their grounds.

Senator CRANSTON. Fine. If you would, please reply in writing to this committee after you have had time to examine it.

Ambassador KENNEDY. I will.

[The information referred to follows:]

STATE DEPARTMENT'S COMMENT ON THE NRC LETTER TO CONGRESS

The NRC has not informed us of their specific reasons for the concerns expressed in their letter. We do not believe there have been recent events which should trigger a substantial change in our export policies.

The NRC statement oversimplifies a complex subject, and may therefore be misleading. The IAEA applies safeguards so as to maximize the probability, or chance, that, should an attempt be made to divert nuclear material at a facility, that attempt would be detected. There is a specific provision for prioritizing effort on those diversion possibilities involving the most sensitive material. There cannot be an absolute certainty that all diversions paths are covered for example some may be identified after the time the safeguards approach to a given facility is developed, and some may be prohibitively expensive for a divertor. These facts are taken into account when designing the approach. As problems arise, such as in the case of some on-load refueled reactors, the IAEA takes steps to solve those problems. The application of safeguards is a continuously evolving process. We believe that, at the present time, the IAEA has at its disposal all the techniques and instruments necessary to detect, in most cases with sufficiently high probability to result in deterrence of the diversion of nuclear materials. In those cases where the detection probability is not as high as we would like efforts are underway to make the necessary improvements.

The United States continues to regard the international safeguards system of the IAEA as performing an essential role in our effort to prevent the further spread of nuclear weapons.

At the same time, the United States has been engaged in extensive efforts to improve the technical, legal and conceptual aspects of the safeguards regime to keep it abreast of changing conditions and technology. Important progress has been made and these efforts are continuing.

Senator CRANSTON. What initiatives has the Reagan administration taken to strengthen and improve the IAEA?

Ambassador KENNEDY. We have with the President's statement indicated our intentions, within the limits of our own resources, of course, to make available resources, both in terms of money, in grants and in kind of equipment, and in personnel.

Senator CRANSTON. Are there plans to go beyond that to strengthen the present procedures and practices?

Ambassador KENNEDY. Yes, sir, there are. A long range program has been developed over some time. Indeed, it was done I think in part at the urging and with the support of the Congress about 2 or 3 years ago, and a 5-year long-range program was established. We are going to continue that and hopefully, again, resources permitting, we want to increase that.

I mentioned also—I think you were absent—let me add that we are also making an effort with other countries to get increased participation in the way of financial and other support.

Senator CRANSTON. It seems to me that you are talking mainly about the present procedure, just providing more money and getting more participation. But what plans does the State Department have, if any, to improve and strengthen, revise the present procedures, practices, rules, and so forth?

Ambassador KENNEDY. We have given the incoming Director General our indication of our support and willingness to work with him in this regard.

Senator CRANSTON. I gather no particularly far-reaching proposals are in the works as far as the administration is concerned.

Ambassador KENNEDY. Not at this time, no, sir.

Senator CRANSTON. Do you personally believe that the IAEA safeguard on the CANDU and the KANUPP reactor in Pakistan are adequate to detect a diversion of spent fuel?

Ambassador KENNEDY. The answer as a general proposition is yes, sir, provided that the surveillance systems are installed to cover the diversion paths as they have been identified by the Agency. It is to this end, indeed, that the Agency is now going to all of the owners and operators of these on-load refueling systems.

Senator CRANSTON. Well, has that occurred or is that occurring?

Ambassador KENNEDY. It is in process.

Senator **Cranston**. And you really believe that they would be adequate to detect any diversion.

Ambassador **Kennedy**. If these surveillance systems are put in place and the inspections occur as they are planned, the answer is "Yes, sir."

Senator **Cranston**. Thank you very much.

Thank you. That is all I have, Mr. Chairman.

The **Chairman**. The wording of the resolution that we will introduce is very simple:

> It is the sense of the Congress that the United States should take no actions in connection with its defense programs which would undercut existing SALT agreements so long as the Soviet Union exercises the same restraint.

You may take a copy of this along with you, Secretary Kennedy, if you would like to.

Ambassador **Kennedy**. Thank you.

Senator **Cranston**. Mr. Chairman, I would like to cosponsor that with you, if I may.

The **Chairman**. We would be very happy to add you as a cosponsor, Senator Cranston, because of your long leadership in this field.

Thank you very much, Secretary Kennedy, and we will keep the record open for some questions to you. We appreciate very much your being here and are sorry for the delay in beginning this hearing.

Ambassador **Kennedy**. Thank you very much, Mr. Chairman. We appreciate it.

Thank you, Senator Cranston.

The **Chairman**. To Mr. Harry R. Finley, the Associate Director of the International Division of the General Accounting Office I would like to say that it would be the intention of the Chair not to ask you to stay on. You are our last witness, and it would be perhaps another hour before we got to you. It will be satisfactory to the committee to have your statement submitted for the record.

We very much appreciate GAO's work in this area. We are certainly happy to have you stay, but you will not have to stay if you have other matters that require your attention.

[Mr. Finley's prepared statement follows:]

PREPARED STATEMENT OF HARRY R. FINLEY, ASSOCIATE DIRECTOR, INTERNATIONAL DIVISION, U.S. GENERAL ACCOUNTING OFFICE

Mr. Chairman and Members of the Committee, we are pleased to discuss with you our review of the nuclear safeguards applied by the International Atomic Energy Agency (IAEA) and the intensified U.S. effort to upgrade them. In our classified report issued earlier this year we presented a detailed assessment of IAEA safeguards and the intensified U.S. program to improve them.

It has long been recognized that both nuclear energy and nuclear weapons depend, in large measure, on the same technology and use much the same type of material and production facilities. To detect any diversion of U.S. nuclear material supplied abroad which might be used for other than peaceful purposes, the United States initially established its own bilateral safeguards system. However, with the inception of IAEA and the development of other nuclear suppliers, the United States phased out its bilateral program in favor of international safeguards.

IAEA was created in 1957 to accelerate and enlarge the contribution of nuclear energy to peace, health, and prosperity throughout the world without furthering any military purpose. One of its responsibilities is to administer an international safeguards system, but, as reflected in its budget, applying safeguards is not its primary function. (Only about 24 percent of IAEA's total resources are expected to be used for safeguards in 1982).

EFFECTIVENESS OF SAFEGUARDS

The desired effects of IAEA safeguards are to (1) deter, through prompt detection, national diversions of safeguarded nuclear material; (2) place responsibility on the host country for instituting domestic programs to guard against subnational diversions (such as individuals or groups acting contrary to government policy); (3) reduce specific international tensions, by providing a degree of assurance among countries, especially hostile neighbors, that the safeguarded country is not developing nuclear explosive devices; and (4) insure that international nuclear commerce can be freely conducted without contributing to insecurity and tension among nations. IAEA hopes to apply safeguards with a high degree of reliability and assurance, within acceptable cost limits, and without unduly interfering with commercial operations.

The extent to which IAEA safeguards are considered effective is largely a matter of judgment. It would be difficult to prove whether or to what degree safeguards have achieved their desired effect. Effectiveness obviously involves many subtle factors such as the inhibiting effect that the mere application of IAEA safeguards might have on a nation harboring thoughts of a nuclear diversion. Nevertheless, it is clear that the credibility of international safeguards is basically dependent upon the probability of prompt detection. In many cases this probability of prompt detection needs to be increased.

We believe substantial improvements are required if the IAEA is to adequately fulfill its increasing safeguards responsibilities. The number of facilities and the amount of nuclear material under safeguards has increased rapidly in recent years. Many of the nuclear facilities now subject to safeguards are larger and more complex than those originally under safeguards. To meet its responsibilities, IAEA needs more technical, political, and budgetary support from its members.

International safeguards are a cornerstone of the non-proliferation regime. In essence, the United States and other nations around the world have placed great trust and reliance in the IAEA to deter would-be diverters and provide timely warning if safeguarded material is diverted. Before discussing the status of IAEA safeguards, it may be useful to point out the following facts about the scope of international safeguards.

The vast majority of nuclear facilities and material in non-nuclear weapons nations is subject to IAEA safeguards. However, membership in IAEA does not obligate a country to accept safeguards on all its facilities. For example, India, Israel, and South Africa have facilities not subject to IAEA safeguards. Pakistan is developing facilities which apparently will not be safeguarded.

Nuclear facilities of nuclear weapons countries are not subject to IAEA safeguards except on a voluntary basis. Of the nuclear weapons nations, the United Kingdom, France, and the United States have agreed to place their facilities—except those of direct national security significance—under IAEA safeguards. However, nuclear facilities in the Soviet Union and the People's Republic of China are not under safeguards. China is not even a member of IAEA.

IAEA inspectors do not have unlimited access on their inspections. They have no authority to pursue or recover diverted material. IAEA safeguards are not designed or intended to search for undeclared or clandestine facilities.

If an IAEA inspector cannot verify the non-diversion of nuclear material, the country must be given a "reasonable time" to take corrective action, before procedures for non-compliance may be initiated. Such procedures may include notification of member nations and the United Nations as well as the recall of IAEA-sponsored material. Although IAEA has never used these procedures, it seems clear that by the time sanctions could be applied, the country might have had sufficient time to complete its weapons development.

STATUS OF SAFEGUARDS

IAEA has reported that it has not detected any discrepancy which would indicate the diversion of a significant amount of safeguarded nulcear material, and has concluded that all such material remains in peaceful nuclear activities or is otherwise adequately accounted for. However, the degree of confidence that can be associated with current IAEA safeguards depends on such things as the amount, scope, and nature of the inspection effort.

International safeguards have reached different degrees of development for different types of facilities; in part, because IAEA experience in safeguarding certain types is considerably greater than for others. For example, IAEA has experience in safeguarding thermal power reactors (particularly light water reactors), but limited experience in safeguarding fast breeder reactors. Also, IAEA has experience in safeguarding certain bulk handling facilities—conversion and fabrication plants—but limited experience in applying safeguards to reprocessing and enrichment plants. Such plants are key to the proliferation issue because they provide direct access to weapons-usable material. The reason why IAEA has had limited experience in safeguarding certain facilities is that in general they are few in number and located primarily in nuclear weapons nations which have not been required under the Nuclear Non-Proliferation Treaty to place civil nuclear facilities under IAEA safeguards.

Several factors hinder IAEA in applying safeguards including (1) a limited number of inspectors, (2) a lack of suitable techniques and equipment, (3) inadequate nuclear material accounting practices by some nations, and (4) political constraints. Moreover, IAEA is experiencing financial constraints in performing its increasing safeguards responsibilities. It seems reasonable to conclude that IAEA's safeguards effectivness has been adversely influenced by these problems.

IAEA has an obligation under its safeguards agreements to conduct inspections. To fulfill its safeguards responsibilities, IAEA must have the necessary manpower to inspect, verify, and insure that a diversion of peaceful nuclear material has not taken place. However, the number of IAEA inspectors has not kept pace with its rapidly growing safeguards responsibilities.

The lack of suitable safeguards equipment is a primary reason why quantitative verifications in many cases cannot be adequately made. A substantial amount of material is in a form that is currently unmeasurable. While improvements have been made in recent years in the equipment to verify nuclear materials quantitatively, U.S. officials recently concluded that more reliable and suitable measurement equipment was needed by inspectors. In addition, containment and surveillance systems are not reliable for assuring the integrity of material control and accountability systems.

A nation is obligated to provide IAEA with accounting records and reports for all its nuclear material subject to safeguards. IAEA officials have repeatedly indicated a need for some nations to improve the quality of the nuclear material accountability information. To help alleviate these difficulties, the United States has provided training to officials of other nations in implementing national systems for the accounting and control of nuclear material.

Effective safeguards depend in large measure on the intent and cooperation of the host nation. In some cases, IAEA has had some difficulty in obtaining such cooperation. An example of this is the conditions established by some nations in consenting to the designation of inspectors. While it is the right of every nation to accept or reject a proposed inspector, there is the serious and growing practice of rejecting whole categories of proposed inspectors on political, linguistic, or nationalistic grounds. According to IAEA's Director General, this practice has unfortunately led to retaliatory discrimination, distortions of the recruiting pattern, and ineffective deployment of inspectors in the field.

The IAEA Statute provides that the cost of safeguards is to be apportioned among all member nations. The reason for this was that the imposition of international controls is in the interest of the world community. However, with the advent of the Nuclear Non-Proliferation Treaty, many members, particularly developing nations, were concerned that expected increases in safeguards expenses would have the effect of increasing assessed contributions and/or diminishing other IAEA programs. Because of mounting costs of safeguards and the controversy as to how these costs were to be met, a complex formula was developed in 1971. Since then, more than two-thirds of the member nations have been insulated from an increased financial responsibility for implementing new safeguards.

Of IAEA's 110 members, 74 contribute less than 2 percent of the funding for safeguards. For 1982, 31 members are being assessed about $750 for safeguards—the same as the lowest assessment made in 1971. Many member nations maintain that the financial resources of IAEA should be used primarily for technical assistance to less developed nations and to promote peaceful uses of nuclear energy. Thus, while many nations, in theory, fully support international safeguards, many are less supportive financially.

The United States has encouraged other member nations to render special assistance to IAEA in the technical aspects of safeguards. Several are now providing technical assistance to IAEA. These special assistance programs of member nations represent a commitment to improving safeguards, and further efforts should be encouraged. Nevertheless, such programs should not lead to the dilution of the basic premise that the cost of IAEA safeguards are to be apportioned among all member nations.

In July 1975, we reported that political, financial, technical and material accountability problems were being encountered in applying international safeguards. Since that time, efforts have been made to address some of these issues, but the magnitude of IAEA's safeguards responsibilities has outpaced these efforts and IAEA continues to encounter the same basic problems.

We believe a commitment by all member nations is needed if IAEA is to fulfill its increasing safeguards responsibilities.

U.S. EFFORTS TO UPGRADE INTERNATIONAL SAFEGUARDS

To help the Agency upgrade its safeguards system, President Ford, in 1976, pledged $1 million of special help annually for 5 years. In line with the President's pledge, the Department of Energy, the Arms Control and Disarmament Agency, the Nuclear Regulatory Commission, and the Department of State initiated a program of coordinated actions in support of Agency safeguards, including the Program of Technical Assistance to Safeguards.

This technical assistance program was originally to be of limited life and was intended to provide quick reaction to urgent needs, as identified by IAEA, to improve safeguards effectiveness where normal Agency budget channels could not respond fast enough.

From fiscal year 1977 through fiscal year 1981, the United States provided about $23 million through this special technical assistance program to improve international safeguards. In addition, the Department of Energy, the Arms Control and Disarmament Agency, and the Nuclear Regulatory Commission each have their own programs designed to support international safeguards. Since 1977, these agencies have expended a total of about $30.6 million on these programs. Nevertheless, U.S. officials stressed that the special U.S. assistance program has become the main vehicle for providing technical resources, funds, and other support to improve international safeguards as envisioned by the Nuclear Non-Proliferation Act of 1978.

United States and Agency officials did indicate that this special U.S. assistance program has helped the International Atomic Energy Agency but during our review, U.S. officials conceded that this special U.S. program had not yet had as significant an impact on actual safeguards implementation as had been hoped.

The most noteworthy accomplishments have been improved inspector training and a better information processing capability through improved data processing software and hardware. Cost-free experts, which supplement the Agency's staff, also have provided valuable assistance in the areas of equipment technology and the development of systems studies to improve safeguards techniques. The Agency's capability to verify some nuclear materials quantitatively was improved by the development of new instruments such as the neutron coincidence counter for plutonium.

Despite the progress made, most of the equipment resulting from the special U.S. assistance program was still in the evaluation and test stages and was not being used routinely on inspections at the time of our review. Inspectors complained that the system studies seem to be aimed at longer-term problems and not at solving current ones. It also appears that IAEA may not have the ability to absorb the results of some projects. Moreover, the IAEA has become much more dependent on the United States for support of safeguards improvements.

The procurement of new safeguards equipment and the expense of maintaining (and later replacing) such sophisticated equipment will probably become a significant factor. If IAEA does not have adequate resources in its budget, then IAEA dependence on the support of the United States and a few others may further increase.

SUPPORT FOR IMPROVING SAFEGUARDS SEEMS APPROPRIATE

Continued support to improve safeguards seems appropriate. The cost of safeguards is low compared to the costs of world insecurity and increased military weaponry. However, care must be exercised so that IAEA does not become too dependent on the United States for its support. To retain its character as an international organization, IAEA must receive technical, political, and financial support from all its members. Once the member nations are convinced that serious problems exist, they should demonstrate their support if they are truly committed to effective Agency safeguards.

NO CHANGE NEEDED IN U.S. LEGISLATION

The Nuclear Non-Proliferation Act of 1978 reaffirmed U.S. support to strengthen IAEA safeguards. In this regard, there appears to be no need to revise the U.S. legislation. However, the United States must get more member nations to recognize the serious limitations impeding the effective application of IAEA safeguards and to join together in resolving these problems.

IAEA is a unique international organization; the application of its safeguards program represents an exceptional concession of national sovereignty by safeguarded countries. There is no ready replacement for it, so efforts must be expended to improve the existing establishment.

This completes my statement, Mr. Chairman. We will answer any questions that you may have.

The CHAIRMAN. Some of our other witnesses have come from as far as California, and we will ask for their personal testimony.

Our next witness is Mr. Victor Gilinsky, Commissioner of the U.S. Nuclear Regulatory Commission.

Mr. Gilinsky, we welcome you very much indeed. This is not the first time you have testified before us, and it will not be the last, but this is a particularly crucial time, and we are happy to have your statement.

STATEMENT OF VICTOR GILINSKY, COMMISSIONER, U.S. NUCLEAR REGULATORY COMMISSION

Mr. GILINSKY. Thank you very much, Mr. Chairman.

I would like to present a somewhat abbreviated version of our written statement and submit the full statement for the record.

The CHAIRMAN. The full text will be incorporated in the record.

Mr. GILINSKY. Mr. Chairman, I am pleased to be here this morning to testify on behalf of the Nuclear Regulatory Commission regarding the ability of the IAEA to safeguard peaceful nuclear facilities and activities. Our chairman regrets not being able to be here today. He is on the west coast meeting a commitment of long standing.

As you know, the Commission's interest in this subject arises out of our responsibility for nuclear export licensing. The Atomic Energy Act, as amended by the Nuclear Non-Proliferation Act [NNPA], conditions the export of nuclear materials and facilities upon the Commission finding, among other things, that IAEA safeguards will be applied with respect to any such export. In addition, the Commission must find that the export is not inimical to the common defense and security of the United States. While the Commissioners are not of one mind on the legal basis for inquiring into the adequacy of IAEA safeguards, and in fact, two Commissioners have asked Congress to clarify the NNPA on this point, they are nevertheless unanimous that available information bearing on the adequacy of such safeguards in specific export cases must be taken into account.

In practice, the Commission obtains very little information about the details of the application of IAEA safeguards. In a February 1978 letter to this committee at the time of its consideration of the NNPA, Chairman Hendrie noted that the U.S. Government, including the

NRC, did not have direct access to country-specific information on IAEA safeguards effectiveness. This is still true.

The reasons for this go back to the origins of the IAEA. In order to ease the acceptance of international safeguards, the IAEA statute provides that no industrial secret or other confidential information should be divulged to third parties by the IAEA. In practice, this prohibition has been interpreted in the broadest manner to withhold information about the details of the safeguards system. Thus, for example, the subsidiary arrangements and other documents related to the application of safeguards in a particular country or at a particular facility are not available to other members of the IAEA.

The Commission does receive some information, both unclassified and classified, on the application of safeguards from the executive branch and the IAEA. The IAEA publishes an annual report and also provides its annual safeguards implementation report to each member of the Board of Governors. NRC obtains this document on a classified basis. The preparation of these reports is a step in the right direction. However, the Commission believes that more information should be reported to the Board by the IAEA Secretariat. We also believe that the United States should make every reasonable effort to gain better and more timely information on overall international safeguards effectiveness and on any significant safeguards problems in countries receiving U.S. exports.

In your letter inviting Commission testimony at this hearing, you asked us to address the strengths and weaknesses of the IAEA safeguards system. The question is clearly a vital one. Working to achieve effective international safeguards has been a central element of U.S. nonproliferation policy. The Commission supports the President's commitment to work with other nations to help the IAEA improve the international safeguards regime. As increasing numbers of large and sophisticated nuclear facilities come into operation around the world, the IAEA safeguards system will have to increase in size and capability. An effective international safeguards system is an essential element of our national security and warrants serious attention and commitment along with our other defense objectives.

The question of IAEA's strengths and weaknesses is also a difficult one for the Commission to answer. As I have indicated, we receive relatively little information on the subject, and much of what we do receive is classified. As a general observation, the IAEA possesses the strengths and weaknesses characteristic of international organizations. Its strength lies in its ability to serve as a forum in which the member nations can work cooperatively toward international standards governing the use of nuclear energy. It has served to highlight the necessity for international safeguards to protect against diversion of civilian nuclear materials. As an international institution, the IAEA is unique in providing for onsite inspection in member countries. Its weakness is that, in practice, it cannot enforce the standards agreed upon by its members. It is hesitant to act against a member state, it accepts many constraints imposed by member states on inspections, and its senior officials tend to be overly cautious about facing important issues. All in all, because of these weaknesses, it appears the IAEA safeguards system may no longer be adequate in some instances.

The Commission's concern regarding the weaknesses in IAEA safeguards is reflected in our chairman's letter of November 27 to you, which you have entered into the record.[1]

This letter also notes that the Commission is reviewing its statutory responsibilities for licensing U.S. nuclear exports in light of these concerns.

You also requested the Commission's suggestions for improving IAEA safeguards, and the rest of the testimony lists a number of these dealing with technical matters as well as suggestions for improving the management of the Agency.

I would simply like to close by saying that we would emphasize that while progress has been made in improving the technical aspects of international safeguards, the more difficult problem remains the political pressures on the Agency.

That completes the Commission's statement.

[Mr. Gilinsky's prepared statement follows:]

PREPARED STATEMENT OF VICTOR GILINSKY

I am pleased to be here this morning to testify on behalf of the Nuclear Regulatory Commission regarding the ability of the International Atomic Energy Agency to safeguard peaceful nuclear activities. As you know, the Commission's interest in this subject arises out of our responsibility for licensing the export of nuclear materials, facilities, and components. The Atomic Energy Act, as amended by the Nuclear Non-Proliferation Act of 1978 (NNPA), conditions the export of nuclear materials and facilities upon the Commission finding, among other things, that IAEA safeguards will be applied with respect to any such exports. In addition, the Commission must find that the export is not inimical to the common defense and security of the United States. While the Commissioners are not of one mind on the legal basis for inquiring into the adequacy of IAEA safeguards—two Commissioners have asked Congress to clarify the NNPA on this matter—they are unanimous that available information bearing on the adequacy of such safeguards in specific export cases must be taken into account.

In practice, the Commission obtains very little information about the details of the application of IAEA safeguards. In a February 1978 letter to this Committee, at the time of its consideration of the NNPA, Chairman Hendrie noted that the U.S. Government, including NRC, did not have direct access to country-specific information on IAEA safeguards effectiveness. This is still true.

The reasons for this stem from the origin of the IAEA. In order to ease the acceptance of international safeguards, the IAEA Statute provides that no "industrial secret or other confidential information" should be divulged to third parties by the IAEA. In practice, this prohibition has been interpreted in the broadest manner to withhold information about the details of the safeguards system. Thus, for example, the "subsidiary arrangements" and other documents related to the application of safeguards in a particular country or at a particular facility are not available to other member nations of the IAEA.

The Commission does receive some information, both unclassified and classified, on the application of IAEA safeguards from the Executive Branch and the IAEA. The IAEA publishes an annual report and provides its annual Safeguards Implementation Report (SIR) to each member of the Board of Governors. NRC obtains this document on a classified basis. The preparation of these reports is a step in the right direction. However, the Commission believes that more information should be reported to the Board by the IAEA Secretariat. We also believe that the United States should make every reasonable effort to gain better and more timely information on overall international safeguards effectiveness and on any significant safeguards problems in countries receiving U.S. exports.

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[1] See page 2.

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The Commission's concern regarding the weaknesses in IAEA safeguards is reflected in the Chairman's letter of November 27, 1981, to you, which I would like to submit for the record. This letter also notes that the Commission is reviewing its statutory responsibilities for licensing U.S. nuclear exports in light of these concerns.

You also requested the Commission' suggestions for improving IAEA safeguards. The following are some specific suggestions:

Delays in reporting nuclear material inventories and transfers should be reduced or eliminated. Many states have routinely been tardy in reporting transfers and inventories of nuclear material, and the IAEA has experienced problems with matching records of supplier and recipient states, particularly when one is a nuclear weapons state. In November 1980, the IAEA requested states' cooperation in revising reporting procedures. The NRC is working with other U.S. Government agencies to assist the IAEA in developing workable procedures for more accurate and prompt accounting for material in international transfers.

Use of updated safeguards techniques should be agreed to by member countries. The IAEA has had difficulties obtaining the agreement of states to revise the safeguards procedures at their facilities to incorporate recent advances in equipment and procedures. We believe that a more determined effort should be made to secure the agreement of states to renegotiate "subsidiary arrangements," and the Board of Governors should provide more guidance and direction on this matter.

Safeguards technology, equipment, and procedures for safeguarding many types of facilities need to be more fully developed. In particular, the types of facilities of greatest proliferation concern (for example, reprocessing plants, enrichment plants, and large materials test reactors) present unique safeguards problems. The U.S. Program of Assistance to International Safeguards (POTAS), and other technical assistance programs by other countries, are designed to resolve these issues. We believe that continued U.S. activities in this area are important to the improvement of IAEA safeguards.

IAEA internal management procedures need improvement. The IAEA recently had an international management consulting firm examine IAEA management and personnel practices and recommend improvements. This study was paid for with U.S. funds provided under the POTAS program. We have not examined this study, and so cannot comment on the recommendations, but we consider the fact that it was done to be a step in the right direction.

In closing, we could emphasize that, while progress has been made in improving the technical aspects of international safeguards, the more difficult problem remains the political pressures on the IAEA.

Mr. GILINSKY. I have a few additional remarks of my own which I would like to share with you, if I may, Mr. Chairman.

The first of these concerns "timely warning." This is nothing more than shorthand for the commonsense notion that, if a warning is to be of any use, it has to come in time to prevent the wrongdoer from achieving his purpose. In the case we are talking about here today, that means to prevent him from producing nuclear explosives.

Now, if an international inspection system cannot alert countries in time for them to thwart a would-be bombmaker, it is not much good. It means the inspection system is not functioning as well as it should; unless, of course, it is intrinsically impossible to provide timely warning because the materials in question are too close to bomb making; in other words, if they are too dangerous to be protected merely by inspection, which is the case with plutonium and highly enriched uranium.

Now, that is the way the Acheson-Lilienthal report formulated the problem way back in 1946, and that formulation has not been improved upon. The idea was also central—and this is often forgotten—to our original offer to share nuclear technology under Atoms for Peace. This offer was premised on our scientists providing what President Eisenhower called "special safe conditions under which * * * fissionable material can be made essentially immune from surprise seizure." Unfortunately, that was forgotten along the way.

Timely warning was brought into prominence, again, in the Nuclear Non-Proliferation Act, which requires that in making certain judgments on safeguard, the responsible U.S. officials are to give foremost consideration to assurance of timely warning of diversion, that is, warning well in advance of the time a diverter could produce nuclear explosives.

I bring this up because I would like to make the point that the IAEA uses a different, weaker standard of timely warning. It aims to detect diversion not well in advance of the time illicit bombs might be fabricated, but about at the same time as the bombs could be fabricated, so that even if the IAEA system were working exactly as it is designed to do, an announcement of suspected diversion might or might not come before we read about an explosion in the New York Times.

Unfortunately, the Agency does not even come close to meeting its own weaker standards. The reasons for this have to do not so much with deficiencies and safeguards gadgetry as with deficiencies in the way the Agency is set up and managed. The weaknesses of the system are much more profound and structural than failures in cameras or seals. They have to do with such things as bureaucratic incentives in international organizations and political pressures of member states.

To begin with, the system is not geared to spotting and announcing trouble. Imagine what you would think of NRC inspectors if they had to be approved individually by the utilities, if an individual inspector could be vetoed by the utility to be inspected, if the date of the inspection were negotiated with the utility, if the scope of the inspection were strictly circumscribed, and if the inspectors were at all times shepherded by utility personnel.

But it is even worse than that. I asked an ex-IAEA inspector, and I might say, not an American, what he would have done if in the course of an inspection he had come across clear evidence of diversion. He told me that he and his fellow inspectors believed that if they would accidentally stumble across such evidence they would not leave the country alive. What does this say about their motivation?

They are, of course, unlikely ever to stumble across such clear evidence. Even in the most suspicious circumstances there are always ambiguities. If the inspectors and their Vienna superiors take refuge in the uncertainties and ambiquities of the situation and insist on a very high degree of certainty before sounding an alarm, then we can be sure that the alarm, when it comes, will be too late.

But that is exactly the tendency of the IAEA inspectorate because from their point of view—and it is understandable—the penalties for being wrong are high in terms of embarrassment both for individual inspectors and for the Agency. And the headquarters bureaucracy is, if anything, even more cautious than the inspectors. The top people in the Agency are—again, understandably—extremely anxious to avoid offending any of the member states.

This explains in part the secrecy that surrounds the operation of the IAEA safeguards system. For example, the annual IAEA safeguard implementation report, which contains no safeguards confidential information—that is an IAEA label—is treated as a classified document, by us as well.

Now, you have to ask yourself, from whom is it being kept? Potential diverters? No. They and every one of the other hundred odd member states have copies.

From whom, then, is the document kept? Well, in this country, from the Congress and the public.

The only way to make sense out of this is to see that the IAEA's chief function is to make nuclear commerce acceptable, not to protect it. Which brings me to the most important point.

It is all very well to complain about the inadequacies of the IAEA, but when you get right down to it, it's a creature of its member states. None of them wants a system that causes embarrassment in international discourse. All of them want the prestige of nuclear status, whether they need it or not. And all too many of them, particularly the supplier states and their nuclear industries, want to preserve a laissez faire approach to international nuclear commerce.

Thank you, Mr. Chairman. That completes my own personal remarks.

The CHAIRMAN. Thank you very much indeed for your helpful testimony.

I would like to start first with the letter of November 27 in which it is declared that the NRC had serious reservations about IAEA safeguards, but NRC comments that have accompanied requests for export licenses have essentially stated the same thing for the past 2 or 3 years.

I wonder if you could tell the committee what caused the NRC to send the letter at this particular time. It did focus a lot of attention. That is admitted. The same kind of comments have, however, been implied or in a sense made, as I have said, in connection with export licenses.

Mr. Gilinsky. Well, it is true, we have worried about safeguards for a long time. Each commissioner, of course, brings a somewhat different background to this subject, but collectively we have worried about them for a good time and expressed our concerns in various ways.

I would have to say that we have now reached the point where the accumulation of these worries has led us to feel we have a responsibility to share them with you, and the precise timing, the fact that it was sent a few days ago has something to do with this hearing. But I think it would have come about this time in any case.

The **Chairman.** Well, it was certainly timely.

Does it represent the unanimous consensus of the Commissioners?

Mr. Gilinsky. Yes, it does. Every Commissioner's office has approved this letter.

The **Chairman.** Now, turning to your own testimony, you enumerated several IAEA weaknesses; namely, that it cannot enforce standards; it is hesitant to act against member states—and that is a problem always with international organizations, which we see at the U.N. all the time; it accepts too many constraints on inspectors, and so forth.

These criticisms seem applicable to, as I say, most international organizations. Given the strong sense of nationalism in the world, do you envision that States will relinquish enough of their sovereignty to make the IAEA really workable? That is, is it possible to envision that it might someday have police and enforcement powers?

Mr. Gilinsky. Probably not, but one hopes that nations will agree to relinquish more of their sovereignty than they have in the past. It is clear that nuclear technology and unlimited national sovereignty are just not compatible if we want to keep from blowing ourselves up.

It is important, however, that we have a very clear idea of what the system can and cannot do, so we do not lay more on it than it can handle.

The **Chairman.** Well, let's look at what the system can and cannot do. Let's put it in the terms of do we have the will to do it.

You have indicated that there are several ways that IAEA safeguards could actually be improved. How can IAEA be obliged actually to implement these ideas?

In other words, what value do we have from the knowledge that we do have technical procedures and devices that would be more acceptable and would bring us up to the standard that we had hoped to achieve if we do not have the political will to carry them out? Is not a sense of urgency enough on the part of the world to make this an unusual case and not subject to the usual hackneyed type of political considerations that always have to be taken into account in an international organization?

Mr. Gilinsky. I think in many ways we have not managed to communicate to others effectively our own concerns about nonproliferation, which is often looked upon as an American problem, something that we are, so to speak, hung up on. I think if others were clearer on where their interests lie, I think perhaps we would get more support.

But so far as the Agency is concerned, it seems to me that an essential first step is to open up the system to public scrutiny. That seems to me to be terribly important. We can not deal with the problems until we have a clear idea of what they are, and I am not talking just about these general reports, safeguards implementation reports, and so on. In fact, that report does not mention specific countries or specific facilities. It is really at a very general level. I mean opening up things like inspection reports. We do that domestically.

Now, there are certain things you cannot reveal, obviously. You have to agree that proprietary matters will not be revealed. You do not want to reveal information that would make it possible or easier for others to steal material. But a good deal can be revealed about the functioning of the system. That was one of the points in Senate Resolution 179 that was submitted by Senator Glenn and other members of this committee and received overwhelming approval in the Senate. It seems to me simply not understandable that information which is available to 110 countries should not be available right here or to the public.

The CHAIRMAN. Yes.

Mr. GILINSKY. I must say this goal of opening up the system is widely regarded as unrealistic. I must say I regard it as unrealistic to rely blindly on an international bureaucracy that does not tell us enough to know whether or not they are doing their job and protecting our material.

The CHAIRMAN. What is the view of the Commissioners that the NRC should assess the adequacy of safeguards in an importing state as a criterion for deciding whether to license a nuclear export? Should the NRC make a wholly independent assessment, for instance, of safeguards everytime a new license application is field?

Mr. GILINSKY. There is a difference of view on that point. As a practical matter, we do not have information to make an assessment of adequacy in particular instances. Or let me say we seldom have information of that sort. The position I have adopted, and I believe at least one other Commissioner has adopted, is that at least where we do have such information we need to take it into account in applying criterion 1 of the various criteria in the NNPA.

Other Commissioners tie the relevance of safeguards information to other parts of the law and see their responsibilities differently. This is something that we have not come up with a Commission position on.

The CHAIRMAN. Do you think it is desirable for NRC to develop this capability, and if so, what would NRC require in the way of additional resources to carry out such a function now?

Mr. GILINSKY. We have dealt with it more or less on a best efforts basis. So long as more information is not available—and we have tried to get whatever information is available—so long as more information is not available, there is not a great deal more we can do.

I think the entire process, not only in this country but in every country, would benefit if the IAEA system were a much more open and transparent one.

The CHAIRMAN. I want to thank you very much.

I would like to submit the balance of my questions to you for answering in the record, and it will be an important record, I think, for other members of the committee who could not be here today because of the DOD bill which is on the floor. I am sure they will want to read the record.

We appreciate your appearance here very much again, and apologize to you for our delay in getting started because of the floor action.

Senator Cranston?

Senator **Cranston**. Thank you very much, Mr. Chairman.

First I want to congratulate you on your leadership in this field, for the work the NRC has done—and I know you have had a lot to do with its accomplishments, and I appreciate your efforts in expediting that letter. It came at an appropriate time.

Do you believe the NRC should continue to license nuclear exports if the IAEA safeguards are deemed ineffective?

Mr. **Gilinsky**. Well, this question came up immediately. Let me say first that the Commission has not joined on this question. We communicated to you when we reached a conclusion on safeguards. Our next step will be to consider some of the implications. Let me tell you where I think we will go, and where I think we ought to go.

So far as our principal trading partners are concerned, I would expect there not to be a great impact. The export approvals here have depended as much on mutual trust and our close relationship with the various countries—in some cases mutual security arrangements—as they have on the presence of formal IAEA standards and safeguards. But in other cases outside that circle, it may well be a different story, and ought to be, I think.

We are going to have to subject certain exports for some countries to particularly close scrutiny, and for those we approve, we may want to supplement our reliance on IAEA safeguards with reliance on our own efforts. Secretary Kennedy alluded to some of these in his testimony, rightly I thought, and I think we might want to supplement that, or at least we should, with restraint in supply of sensitive materials and technology. I think we have been too free here, even with some of our friends.

Senator **Cranston**. Do you believe it would be "inimical to the common defense and security of the United States" to approve nuclear exports if there is not assurance that their diversion for nuclear bomb production could be detected?

Mr. **Gilinsky**. It depends on where the exports are going. When you say no assurance, then of course the answer would be no, we ought not spend exports where there is no assurance. But I think when we send exports to close friends and allies, that situation does obtain. We do have reasonable assurance.

Senator **Cranston**. What is your personal view as to the NRC's obligations in the area of assuring effectiveness of safeguards on the nuclear exports licensed by the Commission?

Mr. **Gilinsky**. We have to have reasonable assurance that the exports are a safe proposition. Otherwise we cannot approve them.

Now, in the case of the IAEA we have acted in practice on the basis that if IAEA safeguards were applied, and if we did not have adverse information to suggest that they were not being applied properly, then we considered the safeguards to be sufficient.

Over the past, well, years, months, information has come to light and come our way which is not reassuring, and led to this letter.

Senator **Cranston**. Even if the IAEA safeguards were perfect and being perfectly applied, would it be your expectation that all they would do would be to slow down the process of proliferation that under present policies is slowly going to occur?

Mr. **Gilinsky**. I tried to make the point that I do not think they can work for some kinds of facilities. There is no way you are going to get adequate warning when you are talking about reprocessing plants, enrichment plants, or stockpiles of plutonium or highly enriched uranium. We really ought to face that.

In the case of other facilities such as our light water reactors, then I think these can be reasonably protected by a warning system, and that was a distinction, as I said, that was made way back in 1946, and it is still a valid one.

Senator **Cranston**. Thank you very much.

Mr. **Gilinsky**. Thank you.

The **Chairman**. Thank you very much, Mr. Gilinsky. We appreciate your being here very much. You have been very helpful.

Mr. **Gilinsky**. Thank you, Mr. Chairman. We will answer your questions promptly.

The **Chairman**. Thank you.

Our final panel will consist of Paul Leventhal, Nuclear Club, Inc., of Washington; Emanuel Morgan, former inspector, IAEA, and former employee of NRC from Gaithersburg, Md.; and Dr. Thomas E. Shea, former inspector, IAEA, and president of INET Corp., Sunnyville, Calif.

Would it be too much of an imposition on each of you if you could summarize your statement in 5 minutes or so? Your full statements will be incorporated in the record, and then we will open it up for questions.

Again, I apologize particularly to the three of you for the long delay we have had in this hearing, but it has been interesting, and your staying on is very much appreciated.

Dr. Shea, we appreciate your coming in from California.

Mr. Leventhal is a longtime friend and former member of the U.S. Senate staff, a valued member who has specialized in this field, and I am delighted that you are continuing your lifelong devotion to this field. We are pleased to have you with us, and any comments you would care to make would be appreciated.

STATEMENT OF PAUL LEVENTHAL, PRESIDENT, THE NUCLEAR CLUB INC., WASHINGTON, D.C.

Mr. **Leventhal**. Thank you, Mr. Chairman.

In the interest of time, I will summarize. I will highlight my testimony and try to keep it to 5 minutes.

Let me say that as a former Senate staffer who worked on these issues with you and Senator Glenn, I take great satisfaction at today's hearing. To my knowledge, this is the first congressional hearing ever to be held on the particular subject of the safeguards of the IAEA. Such a hearing has been long in coming and is urgently needed to inform the general public, as well as the Congress, on the weaknesses of the IAEA safeguards system. The weaknesses go to the heart of the proliferation problem, and, therefore, endanger us all.

I would like to emphasize that being openly critical of the IAEA safeguards system need not be and should not be construed as an attempt to undermine or to destroy the International Agency. The secrecy surrounding safeguards and their weaknesses is often justified by nuclear advocates as a necessity to preserve the IAEA. The Agency is too weak technically, too vulnerable politically to withstand hard scrutiny, according to this line of reasoning. The assumption is that if the IAEA falls, the whole nonproliferation structure will fall along with it, and peaceful nuclear commerce will be jeopardized. That is the basic argument, and as a result, secrecy, as Commissioner Gilinsky described, has prevailed in the treatment of the weaknesses of the system as well as the findings of the safeguards themselves. It is all kept secret from the public.

The result is the public has been kept in the dark except to receive misleading assurances from government and industry that "appropriate" safeguards are being applied to nuclear exports sufficient to assure their intended peaceful use.

Our contention is that only in publicly airing the weaknesses and the limits of international safeguards is there any hope of strengthening the Agency to the point that it can perform its inspection tasks effectively. This I think is a key point. Only in laying bare the technical and political limits—that is, what reasonably can be expected of an international safeguards and inspection system—is there any hope of steering commercial nuclear enterprise away from technological paths that are unsafeguardable, and therefore too inherently dangerous to be pursued for peaceful purposes, even in nations that we consider our close allies, even in the United States itself.

We must be cognizant of the fact that there is presently locked in highly radioactive, and therefore still relatively inaccessible, spent fuel some 140 tons of plutonium. If the industry gets its way and if the supporting bureaucracy gets its way, that material soon will be separated out and put into commercial circulation as a "peaceful" fuel.

Everything we have learned from the recent disclosures in the Morgan report, which you will hear about shortly, and if we read very carefully the SSIR [special safeguards implementation report], we find there is really no hope of effectively safeguarding separated plutonium in terms of getting timely warning of a diversion. That is only the accounting, surveillance and containment aspect of safeguards. There is also the physical-security aspect—protecting this material when it is transported over long routes within countries and between countries. What is the likelihood of hijacking? What is the likelihood that urban terrorism will become nuclear terrorism?

So I am suggesting, Mr. Chairman, that the weaknesses of the system must be openly acknowledged. It is one thing to classify as "secret" the weaknesses of the safeguards system and then refrain from reporting on the basis of those weaknesses; but it is quite another thing to classify the dangerous weaknesses and then to proceed with nuclear exports as the United States and other nuclear supplier countries now do, on the basis of safeguards being described as adequate and appropriate. That represents safeguards fraud, and I do believe that that is what we are confronted with today.

I hasten to add that the Agency attempts in good faith to fulfill its mandate. I once had the opportunity to go on an IAEA inspection of a Swiss nuclear powerplant back in 1977 and experienced firsthand what an inspection is, and it is a facade. At the end, I asked the chief technical employee of that utility, could you collude with a reprocessor? Is it possible for a utility, or for a nation in which the utility is located, to get into a collusion with a reprocessor, either in the same country or in another country, to divert plutonium for weapons use? And with some degree of reluctance he acknowledged that yes, they could. It was possible.

So we have to understand that it is one thing to apply safeguards and to improve containment and surveillance and hopefully standardized accounting over spent fuel, and to ultimately dispose of that spent fuel in unaltered form. It is quite another thing to try to contemplate and fool ourselves into believing that it is possible to safeguard separated plutonium by the ton. This is material usable by the pound to make Negasaki-type bombs.

And that, I hope, will be the bottom line consideration that this committee comes to appreciate as it begins its oversight of IAEA safeguards. We must not steer the commercial nuclear enterprise along a technological path that is inherently unsafeguardable. Timely warning is impossible when it comes to separated plutonium, particularly in a widespread plutonium economy.

And that I hope is what the Congress will begin focusing on, and then looking at the economic incentives for continuing to use low-grade uranium in light water reactors, hopefully to steer away from heavy-water reactors because of the difficulty of safeguarding these online type facilities. To the extent that we have to utilize nuclear power over the next several decades—and that is not yet clear—but to the extent we have to, it should be limited to safeguardable technologies. We need to apply every possible pressure we can on our closest trading partners and allies, as well as on those nations that we have reason to suspect.

We have to understand also that there is a very discriminatory quality to U.S. nonproliferation policy. The discriminatory quality is that we are concerned about nonproliferation because we have the bomb and we are trying to prevent other nations from getting it. We must operate on a two-track system. At the same time we try to impose nonproliferation standards on others, we have to work in the best of faith to scale down our own nuclear armaments in bilateral discussions we are having with the Soviet Union.

I would like to close by getting to the question that Senator Cranston raised with Commissioner Gilinsky over whether the NRC should not be approving exports in the absence of a finding of safeguards effectiveness. I would contend that current law—you do not have to revise the Nuclear Non-Proliferation Act—current law makes clear the bottom line consideration in the Atomic Energy Act of 1954, that no export shall go forward, no license shall be issued, if the licensed activity is deemed to be "inimical to the common defense and security."

Recently, the NRC as well as the President of the United States became aware of a very interesting footnote by the Department of Defense in guidelines presented to the President on a confidential basis, of course, in preparation for his nonproliferation policy statement. This appeared in the Wall Street Journal, and I would like to submit the Wall Street Journal article for the record.[1] It describes this particular footnote, and the footnote is as follows:

> DOD wishes to express its reservations about the effectiveness of IAEA safeguards, the weakness of the IAEA as an international institution, its susceptibility to Third World and East Bloc politics, its lack of an intelligence capability, and the limits of its scope and jurisdiction.

And here is the key language now—

> in order to guard against undue reliance on the IAEA by those responsible for national security within the United States Government.

The point is that the NRC, in the area of civilian nuclear exports, is the agency of the U.S. Government responsible for national security. It is beholden under the "inimicality" provision of the Atomic Energy Act, 103d, to withhold nuclear exports if, in fact, IAEA safeguards cannot be relied upon to protect the national-security interest of the United States because the exports are going forward on that basis.

There is something akin to a logical progression here: if DOD, the principal agency responsible for national security, is warning everyone else in the Government, including the President of the United States and the NRC, that we cannot rely on IAEA safeguards to protect the national-security interest, and if exports proceed on the basis that safeguards are being effectively applied how can we continue to export on that basis?

That concludes my statement.

[Mr. Leventhal's prepared statement and attachments follows:]

PREPARED STATEMENT OF PAUL LEVENTHAL

Mr. Chairman, I appreciate your invitation to testify this morning on behalf of The Nuclear Club Inc. regarding "the capability of the IAEA to fulfill its safeguarding role in the nuclear non-proliferation regime." You asked for a "candid discussion"—a refreshing request in a vital policy area characterized by anything but candor.

The Nuclear Club Inc. is a new, non-profit educational organization whose membership is a diverse group of citizens opposed to the further spread of nuclear weapons. We are the only educational group whose work is devoted exclusively to preventing "horizontal proliferation"—that is, the spread of nuclear weapons through commercial, or so-called "peaceful," nuclear power and research programs.

Materials further describing The Nuclear Club Inc. and the nuclear proliferation problem are attached to my testimony and, with your permission, Mr. Chairman, I would like to submit them for the record.

As a former Senate staffer who worked on non-proliferation issues and legislation for two Senators who are members of this Committee, let me express satisfaction with today's hearing. To my knowledge, this is the first Congressional hearing ever to be held on the particular subject of the safeguards of the International Atomic Energy Agency. Such a hearing has been long in coming and has been urgently needed to inform the general public as well as the Congress on the weaknesses of the IAEA safeguard system. The weaknesses go to the heart of the proliferation problem and endanger us all.

Let me emphasize from the start that exposure of the weaknesses of IAEA safeguards need not be, and should not be, construed as an attempt to undermine or to destroy the international agency. The secrecy surrounding safeguards, and their weaknesses, is often justified by nuclear advocates as a necessity to preserve the IAEA. The agency is too weak technically, too vulnerable politically, to withstand hard scrutiny, according to this line of reasoning. If the IAEA falls, the international non-proliferation regime will fall with it, and all peaceful nuclear commerce will be jeopardized—so this argument goes.

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[1] See page 57.

Consequently, until recently, virtually all criticism of IAEA safeguards has been classified "secret" by the member governments and "safeguards confidential" by the IAEA itself. Cautious efforts to upgrade the safeguards system have been conducted behind closed doors. The public consequently has been kept in the dark other than to receive misleading assurances from government and industry that "appropriate" safeguards are being applied to nuclear exports sufficient to assure their intended "peaceful" use.

Our contention, Mr. Chairman, is that only in publicly airing the weaknesses and the limits of international safeguards is there any hope of strengthening the agency to the point that it can perform its inspection task effectively. Only in laying bare the technical and political limits of IAEA safeguards is there any hope to steer commercial nuclear enterprise away from technological paths that are unsafeguardable and, therefore, too inherently dangerous to be pursued for peaceful purposes. While there are technological and political means available to upgrade safeguards on reactor spent fuel, there is little hope, as I will discuss in a moment, for developing effective safeguards on weapons-usable plutonium and high-grade uranium derived from reprocessing and enrichment activities.

It is the absence of open criticism and discussion of safeguards weaknesses that poses the greatest danger to the IAEA, to the nuclear industry and to civilization itself. We may awaken one day soon in a world awash in tons of commercial plutonium, with no effective safeguards in place, or possible to put in place, against diversion to nuclear weapons. We will then find ourselves struggling to survive in an age when regional wars become nuclear wars and urban terrorism becomes nuclear terrorism. At that point, it will be too late to bring the situation under control.

Today, we should see ourselves as standing at the edge of an age of nuclear violence, when atomic ploughshares become nuclear swords. It is not too late to turn back, but we have very little time to find our way.

The nuclear industry is now ready to begin separating plutonium from spent fuel for recycling as reactor fuel. This material is suitable for use directly in nuclear weapons. Reprocessing plants in France, Britian, Japan, West Germany, Italy and India already have begun operations on a relatively small scale.

To make matters worse, the industry plans to use separated plutonium in breeder reactors which will produce more plutonium than they consume. A full loading in a breeder contains enough plutonium for several hundred atomic bombs of the Nagasaki type. By the year 2050, if the industry is permitted to carry out its plan, there will be enough plutonium being shipped each year between breeder reactors and fuel facilities, and back again, for hundreds of thousands of atomic bombs. And there will be enough in the cores of the reactors for hundreds of thousands more.

There were early warnings that plutonium cannot be denatured into nonexplosive form. The Acheson-Lilenthal report of 1946 took note of this and warned that "any system based on outlawing the purely military development of atomic energy and relying solely on inspection for enforcement would at the outset be surrounded by conditions which would destroy the system." Yet, despite these early warnings, an international system that looks to plutonium as a "peaceful fuel" and seeks to enforce its peaceful use solely by inspection, is precisely the system that has evolved. We are now at the point that the conditions anticipated in 1946 by Acheson-Lilenthal begin to break down and destroy the international control, or "safeguards", system.

The IAEA safeguards system, for both political and technological reasons, is incapable of providing "timely warning" of theft or diversion of separated plutonium for weapons-making. The political limitations imposed on inspectors are too severe; the technical means of measuring plutonium in process and in storage are too imprecise; the penalties for suspicious or unauthorized nuclear activities are too ambiguous.

There is no "guarding" in safeguards, only IAEA auditing of inventory records kept by plant operators in each nation. The safeguards apply to materials, not to facilities and equipment, and access of IAEA inspectors is severely limited by secret agreements negotiated by each plant operator with the IAEA. The details and results of the inspections also are secret, even from the nation that exports reactors and the fuel to run them. The IAEA has no intelligence-gathering role and cannot search for a weapons facility, or even for a weapons room, in a plant being inspected if its inspectors suspect the existence of such a clandestine operation.

In fact, it is possible for a nation to acquire all the technology and materials needed for construction of nuclear weapons, and to receive assistance in obtaining and using such technology, without violating IAEA safeguards or the Nuclear Non-Proliferation Treaty (NPT). A vibration occurs only when a weapon is actually constructed, assuming a clandestine activity would be detected.

A nation can avoid a violation simply by declaring its intention to build nuclear weapons in response to a perceived threat to its national security, and then, with 90 days notice, withdraw from the NPT.

The present international system, therefore, permits a country under a cloak of legitimacy provided by the NPT and by IAEA safeguards, to actively pursue a military option in the course of conducting its peaceful nuclear program. This is precisely what Israel suspected of Iraq, which is a party to the NPT.

It is also what is generally suspected of other NPT parties with likely nuclear-weapons intentions including Libya, South Korea and Taiwan. Other countries suspected of having nuclear weapons or an interest in acquiring them have refused to join the NPT but do subscribe to IAEA inspections or some or all their nucelar activities. They include: Argentina, Brazil, India, Israel, Pakistan and South Africa.

Israel's pre-emptive strike on the Iraqi research reactor destroyed not only the facility, but also the facade of effective safeguards. Israel was not prepared to rely on safeguards to guarantee the peaceful intent of the nuclear program of Iraq—a nation still officially in a state of war with Israel.

The Israeli raid is a watershed event. It makes clear that future non-proliferation efforts can take a violent turn when one nation doubts the peaceful intent of an adversary's nuclear program and knows that there are no international safeguards in place capable of deterring the development of nuclear weapons.

Precious little time remains to avoid a world of nuclear anarchy and nuclear violence. What can still be done?

First, the weaknesses of the IAEA safeguards system must be openly acknowledged so that public pressure can be brought to bear to remedy them to the extent politically and technically feasible. The secrecy surrounding safeguards must be lifted. To do less is to engage in "safeguards fraud."

It is one thing to classify as "secret" the weaknesses of safeguards and then refrain from exporting nuclear equipment and materials on the basis of those weaknesses. It is quite another thing, however, to classify the dangerous weaknesses in safeguards and to proceed with nuclear exports—as the United States and other nuclear supplier nations now do—on the basis of safeguards described as "adequate" and "appropriate".

That is safeguards fraud.

It is essential to put on the record the confidential concerns and criticisms expressed in government agencies regarding the IAEA. The Nuclear Club Inc. recently petitioned the Nuclear Regulatory Commission to declassify the Morgan Memorandum and to open to the public its deliberations on this document and all documentation concerning ineffectiveness of safeguards. I submit our letter to the NRC for the record.

In addition, the Administration should explain the following confidential assessment of the safeguards system by the Department of Defense:

"DOD wishes to express its reservations about the effectiveness of IAEA safeguards, the weakness of the IAEA as an international institution, its susceptibility to Third World and East Bloc politics, its lack of an intelligence capability, and the limits of its scope and jurisdiction, in order to guard against undue reliance on the IAEA by those responsible for national security within the United States government."

The President's non-proliferation statement made no reference to this warning by the Department of Defense, although it did contain commitments to work for "an improved international safeguards regime" and to "seek to prevent the spread of nuclear explosives to additional countries." These commitments were offset, however, by the President's commitment not to inhibit plutonium reprocessing and breeder development abroad in advance nations "where it does not constitute a proliferation risk," and later in his domestic nuclear policy statement, to promote reprocessing and breeder development in the United States.

It is difficult to understand how commercial reprocessing and breeder activities anywhere do not constitute a "proliferation risk" in the absence of effective safeguards. And if safeguards cannot be effectively applied now or in the future on separated plutonium, how can these advanced technologies be justified—especially when sufficient low-grade uranium, not usable in nuclear weapons, is available to meet the fuel needs of all the current generation of power reactors that are now operating or that can be built well into the next century?

Second, IAEA safeguards should be upgraded in facilities and on materials that are deemed safeguardable. Particular emphasis should be placed on improved containment and surveillance. In particular, the United States should press for the IAEA's acceptance and deployment of the advanced-technology "Operation RECOVER" and "Operation TRANSEAVER" systems. These systems, now being tested on a pilot basis, would permit satellite transmission directly to the IAEA, on a real time basis, of camera surveillance of nuclear facilities and shipments as well as the monitoring of electronic (fiber optic) seals. This system would represent a quantum leap beyond the present system of unescorted nuclear shipments and the labor-intensive, highly inefficient process of overburdened inspectors traveling from facility to facility around the world checking cameras that often don't work and antiquated seals that can be defeated.

In addition, a standardized IAEA materials accounting system should replace the myriad national accounting systems that IAEA inspectors somehow must oversee and verify.

The number of IAEA inspectors should be increased and the technical competence of the inspection force improved. It is scandalous that in an industry in which individual plants cost upwards of a billion dollars, the entire IAEA safeguards program is financed at $25 million a year, utilizing only 146 inspectors to monitor over 737 facilities in 50 countries.

Third, the United States should refuse to export nuclear materials and facilities in connection with reprocessing, enrichment and breeder development. They are not now, nor will they be, safeguardable. The basic objective should be to bar the spread of nuclear explosives in the commercial sector.

The United States should aggressively pursue a policy of withholding nuclear assistance and applying economic sanctions to nations that insist on engaging in these activities. The heart of a successful nuclear non-proliferation policy is the control of nuclear explosives—separated plutonium and high-grade uranium. The best way to control them is to provide leadership to bar their use in commercial nuclear program.

If only natural or low-grade uranium, unusable in weapons, is produced for reactor fuel, and if highly radioactive spent fuel is disposed of internationally in unaltered form, its plutonium still safely locked inside, then it is still possible to prevent nuclear power and research programs from providing a route to nuclear weapons.

The technology now exists for this path to non-proliferation. The economic justification exists as well. For example, plutonium costs $800 a kilogram (2.2 pounds) to reprocess; the equivalent amount of low-grade uranium fuel is about one third this cost. All that is lacking is the political will to say no to nuclear explosives.

The United States, by setting an example with our own nuclear power program at home and by applying moral, political and economic pressure on our nuclear trading partners overseas, can still seek to build the needed global consensus to combat proliferation.

However, given the Administration's present commitment to reprocessing and breeder programs at home and abroad, the leadership for preventing the spread of nuclear weapons must come from entities independent of the Executive Branch—namely the Congress and the Nuclear Regulatory Commission.

Both Congress and the NRC should reconsider the appeal in 1976 by David Lilienthal, the first Chairman of the Atomic Energy Commission, for a U.S. moratorium on all nuclear exports until an effective international non-proliferation regime can be established. It is time for Congress to re-enact a key provision of the original Atomic Energy Act of 1946 that was superseded by the 1954 act establishing the Atoms for Peace program. I am referring to Section 10(a)(1) of the 1946 act, as follows:

". . . until Congress declares by joint resolution that effective and enforceable international safeguards against the use of atomic energy for destructive purposes have been established, there shall be no exchange of information with other nations with respect to the use of atomic energy for industrial purposes. . . ."

In addition, Congress should consolidate all commercial nuclear export activities in the Nuclear Regulatory Commission, including the authority now exercised by the Department of Commerce over export of nuclear components and the authority now exercised by the Department of Energy over the transfer of nuclear know-how and the re-transfer of U.S.-supplied nuclear fuel. This would permit the NRC to act as originally intended by Congress—as an independent check on the proliferation tendencies of the Executive Branch.

The NRC, in the absence of a congressionally mandated moratorium on nuclear exports, should condition approval of export licenses on the basis of its own determination that safeguards can be effectively applied.

The NRC has just informed Congress that it "is concerned that the IAEA safeguards system would not detect a diversion in at least some types of facilities. In addition, we are not confident that the member states would be notified of a diversion in a timely fashion." This is a brave statement by the Commission. But to be meaningful, it must be followed by bold action—that is, to require that safeguards be effective before approving additional nuclear exports. To do less would be to violate its most basic mandate under the Atomic Energy Act—to approve licenses only if the licensed activities are not "inimical to the common defense and security of the United States."

The Nuclear Non-Proliferation Act does not bar the NRC from making an "effectiveness" finding; the Act does not address the issue, and the NRC should take the initiative, hopefully with encouragement by Congressional committees of jurisdiction, including this one.

The Commission, in making an "effectiveness" finding, should look ahead to the ultimate utilization of the materials being exported. The Commission should withhold approval of export licenses for low-enriched nuclear fuel if the recipient country intends eventually to have the fuel reprocessed for extraction of plutonium, which cannot be effectively safeguarded.

Finally, Mr. Chairman, it should be emphasized that non-proliferation policy need not be negatively cast. Positive incentives can be offered to recipient countries, especially in the form of an assured and economic supply of low-grade uranium unusable in nuclear weapons, in exchange for a commitment to forego plutonium and to dispose of spent fuel in unaltered form. The Hart bill, S. 1488, would establish such a system and should be supported.

Mr. Chairman, The Nuclear Club Inc. continues to believe that the spread of nuclear weapons and of nuclear violence are not inevitable unless we assume them to be. We cannot sit passively by and permit our diplomats to seek to manage a proliferated world. A proliferated world is inherently unmanageable and irreversible. Our only hope to prevent the spread of nuclear explosives and to upgrade IAEA safeguards over less dangerous nuclear materials and facilities. If this course is followed, there is still hope.

THE NUCLEAR CLUB, INC.,
Washington, D.C., November 16, 1981.

Hon. NUNZIO PALLADINO,
Chairman, Nuclear Regulatory Commission,
Washington, D.C.

DEAR MR. CHAIRMAN: On November 4, 1981, I attempted to gain admittance to a meeting of the Nuclear Regulatory Commission, which began at 1:30 PM, regarding nuclear export matters. I understand that the meeting, which was closed to the public, was called to discuss whether the Commission should make a determination as to effectiveness of international safeguards prior to approving any additional licenses for the export of commercial nuclear equipment and materials. Also discussed at the meeting, I understand, was the significance of the so-called "Morgan Memorandum" dealing with international safeguards as well as with the appropriateness of the staff decision to classify this document "Secret."

Attached you will find a copy of the note that I submitted to the Commission on November 4, through the Office of the Secretary, expressing a desire "to attend this meeting or to address the Commission briefly on the subject of the Morgan Memorandum and the use of effectiveness of safeguards as a basis of approving licenses for exports." I made this request in my capacity as an officer of The Nuclear Club Inc., a non profit, educational organization whose membership is opposed to the spread of nuclear weapons through misuse of peaceful nuclear materials.

I was told by Mr. Chilk, Secretary of the Commission, that the Commission voted to deny my request. He declined to tell me the actual vote.

The purpose of this letter is to express, on behalf of The Nuclear Club Inc., our grave concern regarding the decisions to classify the Morgan Memorandum and to close the meeting of the Commission at which the document and its implications for the Commission's decision-making on export licenses were discussed. We seriously question whether the Morgan Memorandum was properly classified, and we believe that closing the meeting was improper under the Government in the Sunshine Act (5 USC 552b).

By means of this letter, we also wish to make certain requests of the Commission, and we would appreciate an affirmative response to these requests within ten days of the date of this, as follows:

1. Please describe how the Commission addresses the competing interests of, on the one hand, protecting the public interest by informing the public of the inability of international safeguards to detect diversion of substantial quantities of nuclear explosive materials from peaceful nuclear programs to atomic weapons (as described in the Morgan Memorandum, according to today's New York Times) and, on the other hand, the perceived need to prevent damage to U.S. national security and foreign policy by classifying the Morgan Memorandum and similar documents, thereby barring public access to information about the ineffectiveness of international safeguards.

2. Please describe the basis for classifying the Morgan Memorandum, which, we understand, was prepared at the request of a member of the Commission on a non-classified basis. Please provide us all documentation, including a transcript of the Commission's discussions, that pertain to the classification of this document.

3. Please provide us with an explanation as to why the Commission closed the November 4 meeting and all other meetings that pertained to the effectiveness of international safeguards. Please include with your response a transcript and other documentation pertaining to the Commission's deliberations on the issue of closing the November 4 meeting and other meetings dealing with effectiveness of international safeguards.

4. Please provide us a copy of the Morgan Memorandum, edited, if necessary, to exclude portions that the Commission believes necesary to remain classified.

5. Please provide us with a complete transcript of the Commission's November 4 meeting, edited, if necessary, to delete portions the Commission believes should remain classified, but including, at a minimum, those portions of the transcript discussing the appropriateness of the classification of the Morgan Memorandum and the discussion and the vote to deny my request to attend the meeting or to address the Commission.

6. Finally, we request that in addition to declassifying the Morgan Memorandum and making available the entire transcript of the November 4 meeting, that the Commission agree to open all future meetings regarding this document and other documentation pertaining to the effectiveness of international safeguards and the role of the Commission in determining such effectiveness prior to approving any future licenses for export of commercial nuclear equipment and materials.

To the extent this letter requests any documents, please treat such requests as having been made pursuant to the Freedom of Information Act (5 USC 552). Accordingly, we expect a response to such requests within ten days.

Thank you for your prompt consideration of these requests.

Sincerely,

PAUL LEVENTHAL, *President.*

U.S. NUCLEAR REGULATORY COMMISSION,
Washington, D.C., November 4, 1981.

I would appreciate the opportunity to attend this meeting or to address the Commission briefly on the subject of the Morgan memorandum and the use of effectiveness of safeguards as a basis of approving licenses for exports.

PAUL LEVENTHAL, *President,*
The Nuclear Club, Inc.

THE NUCLEAR CLUB INC., FACT SHEET

What is the Nuclear Club Inc.?

We are a "nuclear club" of a different order—not a roster of nations who have The Bomb, but a diverse group of citizens opposed to further spread of nuclear weapons. We are the only non-profit, educational group working full-time on this problem. We organized in June, 1981, and now actively seek memberships and contributions to support a wide range of planned activities based on this premise: the best defense against the spread of The Bomb is a well-informed public.

Who organized the Nuclear Club?

The Nuclear Club was founded by Paul Leventhal, the President and acting Director, who as a long-time Senate aide until March, 1981, served as Staff Director of the Senate Nuclear Regulation Subcommittee and previously as Special Counsel to the Senate Government Operations Committee. He was responsible for investigations and hearings and for drafting legislation that led to abolishment of the Atomic Energy Commission in 1974 and enactment of the Nuclear Non-Proliferation Act of 1978. He also was Co-director of the Senate Special Investigation of the Three Mile Island Nuclear Accident. In these assignments, he worked closely with Senators on both sides of the aisle, including such Democrats as Hart of Colorado, Ribicoff of Connecticut and Glenn of Ohio, and such Republicans as Percy of Illinois, Javits of New York and Simpson of Wyoming.

Other members of our Board of Directors include:

Dr. Theodore Taylor, a nuclear physicist who designed our nation's largest and smallest atomic (fission) bombs while at Los Alamos, and later became the leading advocate for stronger safeguards against loss of nuclear materials and illicit manufacture of nuclear weapons by nations and terrorists. He also was Deputy Director (Scientific) of the Defense Atomic Support Agency in the Pentagon. He co-authored a book on safeguards problems for the Ford Foundation Energy Project and was the subject of John McPhee's book, "The Curve of Binding Energy." He was a member of the President's Commission on the Accident at Three Mile Island. He now applies his energies to solar alternatives, including development of the "ice pond"—a remarkable, highly efficient way to air-condition large buildings, which also was the subject of a McPhee article in the July 13, 1981 issue of the New Yorker magazine.

Rear Admiral Thomas D. Davies, who retired from the Navy in 1974 to accept a Presidential appointment as Assistant Director of the U.S. Arms Control and Disarmament Agency (ACDA). Serving under three Presidents until January, 1981, he directed ACDA's Nuclear Non-Proliferation Bureau and also chaired the U.S. delegation in two arms-control treaty negotiations with the Soviet Union. In the Non-Proliferation Bureau, he distinguished himself for taking a tough stance against international trade in equipment that utilizes nuclear explosives suitable for atomic bombs. He received the Distinguished Flying Cross for sinking a German submarine during World War II, set a world distance and trans-continental speed record, and commanded North Atlantic Surveillance Operations during the Cuban Missile Crisis.

Julian Koenig, President of Julian Koenig Inc. in New York City, is prominent in advertising and communications and assists in The Nuclear Club's advertising and public education program. He did the original Volkswagon "Think Small" campaign, named "Earth Day" and handled advertising for several political campaigns, including those of the late Robert Kennedy for Senate, Senator Eugene McCarthy for President in the New Hampshire primary, and Senator Jacob Javits and Charles Goodell.

Sharon Tanzer Leventhal, formerly an editor for Houghton-Mifflin and the Twentieth Century Fund, serves as Secretary-Treasurer of The Nuclear Club Inc.

What does the Nuclear Club do?

Assuming adequate funding, we will engage in these activities:

Regularly alert our members and the general public to developments that contribute to the spread of nuclear weapons, and advise on political, diplomatic and technological means to reverse these dangerous trends. We plan a newsletter for this purpose.

Play a watchdog role by conducting research and investigations into dangerous government and industry export activities that permit access to nuclear explosives and fail to strengthen safeguards against diversion or theft of these materials. We will monitor the literature, check with our contacts and observe activities in Congress, Federal agencies and the industry, and track nuclear exports throughout the world.

Respond to invitations to testify before Congress and agencies and to assist in the drafting of legislation and regulations that deal with this problem.

Intervene in, or otherwise litigate, U.S. nuclear-export licensing and administrative actions that bear the risk of spreading atomic bombs.

Conduct an annual membership meeting and other public forums to help stimulate a debate and formulate solutions to the problem of nuclear proliferation.

What is "nuclear proliferation"?

Nuclear proliferation is a hard-to-pronounce term for an easy-to-understand problem: Nuclear materials and equipment, used in research and in generating electricity, can be misused by nations and terrorists to produce nuclear weapons. The United States and other nuclear industrial nations are exporting these commodities throughout the world without taking effective precautions against misuse for military purposes.

"The development of atomic energy for peaceful purposes and the development of atomic energy for bombs are in much of their course interchangeable and interdependent." This was the basic finding of a special committee appointed by the Secretary of State in 1946 (the so-called Acheson-Lilienthal Report), and it remains a basic fact of life today.

No system, technical or political, has been devised to sever this deadly linkage between atoms for peace and atoms for war. After 35 years of efforts to achieve effective international control of atomic energy, the only real "barrier" between civilian and military use of the atom remains the intent of the user. The only effective safeguard, therefore, is to bar direct access to nuclear explosives.

There were early warnings that the most readily made nuclear explosive, plutonium, cannot be denatured into non-explosive form. Acheson-Lilienthal also warned that "any system based on outlawing the purely military development of atomic energy and relying solely on inspection for enforcement would at the outset be surrounded by conditions which would destroy the system."

Yet, despite these early warnings, an international system that looks to plutonium as a "peaceful" fuel and seeks to enforce its peaceful use solely by inspection, is precisely the system that has evolved.

In 1981, we have arrived at a watershed point in history: industry and governments are now ready to make widespread use of plutonium for producing energy. This course threatens to destroy not only the system, but the world.

How big is the proliferation problem?

Today, some 40 nations have atomic energy programs. Most of them have nuclear powerplants in operation, under construction or on order.

The modern nuclear powerplant can produce a billion watts of electricity—enough to meet the needs of a city of one-million people. It is fueled by low-grade uranium that cannot be used in nuclear weapons. But the plant's reactor produces, as a waste byproduct, as much as a quarter-ton of plutonium a year. This plutonium, if chemically separated ("reprocessed") from the reactor's used ("spent") fuel, is enough to make as many as 50 atomic bombs as powerful as the plutonium bomb that destroyed Nagaski.

Nuclear powerplants today, according to data assembled by the Congressional Research Service, are producing some 35 (metric) tons of plutonium a year, enough (figuring a bomb can be made with as little as 10 pounds) for as many as 7,700 atomic bombs. There are 139 tons of plutonium (equivalent to 35,580 bombs) in all of the spent fuel that has accumulated in the world to date.

Even low projections for development of nuclear power indicate alarming growth in stocks of byproduct plutonium in the next decade and by the end of the century:

	1990		2000	
	Per year	Accumulated	Per year	Accumulated
Tons of plutonium	110	760	270	2,690
Equivalent in bombs	24,200	167,200	59,400	591,800

The problem, however, is not hopeless. Most plutonium today remains "locked" in highly radioactive spent fuel, where it is relatively inaccessible for weapons-making. So long as the plutonium remains in this form, it cannot be used in nuclear weapons and it is a manageable—but not foolproof—task for inspectors of the International Atomic Energy (IAEA) to account for it. Even with severe limitations on their authority, the inspectors have the means to observe the spent fuel where it is stored underwater in pools at powerplants sites and to verify that it has not been diverted to weapons production.

But the nuclear industry is now ready to begin separating plutonium from spent fuel for recycling as reactor fuel. This material can be used directly in nuclear weapons. Reprocessing plants in France, Britain, Japan, West Germany, Italy and India already have begun operations on a relatively small scale. While there are technological and political means available to safeguard and to improve safeguards on spent fuel, there is little hope for developing effective safeguards on weapons-usable plutonium and high-grade uranium.

To make matters worse, they plan to use separated plutonium in new "breeder" reactors which will produce more plutonium than they consume. A full fuel loading in a breeder contains enough plutonium for several hundred atomic bombs. By the year 2050, if the nuclear industry carries out its plan, there will be enough plutonium being shipped each year between breeder reactors and fuel facilities, and back again, for hundreds of thousands of atomic bombs. And there will be enough in the cores of the reactors for hundreds of thousands more.

As more and more plutonium is shipped and stored in commerce, the chances increase for hijacking and thefts by terrorists. Experts now acknowledge that making atomic bombs, based on details in the public literature, is within the grasp of physicists and engineers—even undergraduates—if the nuclear explosive materials are available. University-trained scientists are available to increasingly sophisticated terrorist groups. If nuclear explosives become available to these groups as well, nuclear terrorism—the ultimate blackmail—may be just around the corner.

We are at the point that the conditions anticipated in 1946 by Acheson-Lilienthal begin to break down and destroy the international control, or "safeguards," system.

How effective are the safeguards?

The IAEA safeguards system, for both political and technological reasons, is incapable of providing "timely warning" of theft or diversion of separated (pure) plutonium for weapons-making. The political limitations imposed on inspectors are too severe; the technical means of measuring plutonium in process and in storage are too imprecise; the penalties for suspicious or unauthorized nuclear activities are too ambiguous.

There is no "guarding" in safeguards, only auditing of inventory records kept by plant operators in each nation. The safeguards apply to materials, not to facilities and equipment, and access of IAEA inspectors is severely limited by secret agreements negotiated by each plant operator with the IAEA. The details and results of the inspections also are secret, even from the nation that exports reactors and the fuel to run them. The IAEA has no intelligence-gathering role and cannot search for a weapon facility or even for a weapon room in a plant being inspected if its inspectors suspect the existence of such a clandestine operation.

The safeguards system had its beginnings in 1960, when the Nuclear Non-Proliferation Treaty (NPT) came into force, establishing a quid pro quo arrangement whereby nations not having nuclear weapons agreed to forgo them in return for a commitment by nuclear-weapons states to move promptly toward nuclear disarmament. At present, 112 non-weapons states and three weapons states have signed the treaty. Two weapons states, China and France, and 35 non-weapon states have not.

The NPT and the IAEA safeguards system that evolved from the treaty are the centerpiece of U.S. non-proliferation efforts. However, the NPT/IAEA system is dangerously flawed—all the more so because it gives the appearance of effective controls.

Under the treaty, for example, nuclear-weapon states are obligated to fully assist other nations in developing civilian nuclear programs, but are also obligated not to assist these nations "in any way" to acquire nuclear weapons. But providing separated plutonium and bomb-grade uranium, under safeguards, is not regarded as providing assistance in acquiring nuclear weapons. It is permitted, and encouraged, under the NPT.

In fact, it is possible for a nation to acquire all the technology and materials needed for construction of nuclear weapons, and to receive assistance in obtaining and using such technology, without violating the NPT or IAEA safeguards. A violation occurs only when a weapon is actually constructed (assuming such a clandestine activity would be detected).

A nation can avoid a violation simply by declaring its intention to build nuclear weapons in response to a perceived threat to its national security, and then, with 90-days notice, withdraw from the NPT.

The present international system, therefore, permits a country under a cloak of legitimacy provided by the NPT and IAEA safeguards, to actively pursue a military option in the course of conducting its peaceful nuclear program. This is precisely what Israel suspected of Iraq, which is a party to the NPT.

It is also what is generally suspected of other NPT parties with likely nuclear-weapons intentions, including Libya, South Korea and Taiwan. Other countries suspected of having nuclear weapons or an interest in acquiring them have refused to join the NPT but do subscribe to IAEA inspections of some or all their nuclear activities. They include: Argentina, Brazil, India, Israel, Pakistan and South Africa.

What are the lessons of the Israeli raid?

Israeli's pre-emptive strike on the Iraqi research reactor destroyed not only the facility, but also the facade of effective safeguards. Israel was not prepared to rely on safeguards to guarantee the peaceful intent of the nuclear program of Iraq—a nation still officially in a state of war with Israel.

"Its central meaning," declared Senator John Glenn, a member of the Foreign Relations Committee and chief sponsor of The Nuclear Non-Proliferation Act, is "a resounding vote of no-confidence in the international non-proliferation regime, including IAEA safeguards."

In a speech on the Senate floor, Senator Glenn said:

"Even those who condemn the Israeli action recognize that the deficiencies of the international system are so great that any nation which feels threatened by the nuclear developments of its neighbors may be reluctant to bet its life upon the safeguards system.

For too long, the world has been mesmerized with the notion that ritualized inspections and governmental assurances are adequate protections against the dangers of unbridled nuclear trade.

Obviously, if the prescriptions of the past have not worked, and assurances of the present are inadequate, then a new and more effective non-proliferation regime must be constructed on the foundation of the existing one."

The concerns of Senator Glenn and other critics of safeguards are shared, albeit confidentially, at a high level in the United States Government. In a set of non-proliferation guidelines prepared by several Federal agencies for President Reagan, the Department of Defense offered this assessment of the safeguards system:

"DOD wishes to express its reservations about the effectiveness of IAEA safeguards, the weakness of the IAEA as an international institution, its susceptibility to Third World and East Bloc politics, its lack of an intelligence capability, and the limits of its scope and jurisdiction, in order to *guard against undue reliance on the IAEA by those responsible for national security within the United States Government*." (Emphasis ours)

What has been done to stop proliferation?

Little has been done to stop nuclear proliferation. Much has been done to try to manage it. In fact, the popular concept today in the State Department, and among its consultants at Harvard and MIT, is "to manage a proliferated world." For the reasons cited above, however, proliferation may be inherently unmanageable and, once separated plutonium becomes an abundant commercial fuel, irreversible.

Today, "managing a proliferated world" means that the United States should be a "reliable supplier" of nuclear materials and equipment, even if the intentions of the customer country are suspect, the safeguards inadequate, the peacefull-use assurances weak. The basic strategy is to keep the United States involved in nuclear trade and thereby maintain American influence in the nuclear affairs of other nations, even if they are not "reliable customers."

This policy has survived virtually intact over the past 27 years since the birth of Atoms for Peace, despite a brief effort by the Carter Administration and Congress to get tough on proliferation. Even the Nuclear Non-Proliferation Act of 1978, for all its good intentions in the form of export guidelines and of sanctions against violations of safeguards and peaceful-use agreements, is weakened by exceptions and exemptions that permit most nuclear commerce to continue uninterrupted.

Our policy still presumes that the United States, despite its dual role as the leading nuclear nation and the moral leader of the free world, lacks the leverage or the influence to set a non-proliferation example that other nations will follow. It is assumed that sovereignty, economics and national-security interests of industrial and Third World nations will doom a tough U.S. non-proliferation policy to failure.

U.S. policy, consequently, steers away from denial of nuclear supplies and toward acquiescence in the demands of other nations for materials and equipment and for the right to apply them in dangerous ways. In particular, the United States has never ultimately said "no" to a request (even though in many cases we legally can) to transfer U.S.-supplied fuel for reprocessing into separated plutonium.

Instead, U.S. policy is to "manage" the situation on a case-by-case basis, applying an elaborate and complex array of political, economic and security incentives to persuade individual nations to use their acquired nuclear know-how and materials peacefully.

This approach, however, may be akin to the Dutch boy using his fingers to plug a dike. Can we realistically expect to hold back the flood when, in the case of proliferation, it is made up of tens, then hundreds, then thousands of tons of plutonium?

Should we be prepared to export nuclear powerplants to Egypt, with access to plutonium, on the basis of Sadat, after witnessing the potential consequence of such exports to Iran on the basis of the Shah? Can we assume today that any nation, including our closest allies, is of "no proliferation risk" (the Reagan Administration's term), after considering who our past adversaries were and who our future adversaries may be? And if particular nations are of no concern, what of the terrorist threat within those nations?

What can still be done?

The heart of any successful nuclear non-proliferation policy is the control of nuclear explosives—separated plutonium and high-grade uranium. The best way to control them is to build a global consensus to bar their use in commercial nuclear power.

If only natural or low-grade uranium, unusable in weapons, is produced for reactor fuel, and if highly radioactive spent fuel is disposed of internationally in unaltered form, its plutonium still safely locked inside, then there is still hope. This reasonable approach is still obtainable and can help to prevent nuclear power and research programs from providing a route to nuclear weapons.

The technology now exists for this path to non-proliferation. The economic justification exists as well (for example, plutonium costs $800 a kilogram (2.2 pounds) to reprocess; the equivalent amount of low-grade uranium fuel is about one-third this cost). All that is lacking is the political will to say no to nuclear explosives.

A certain degree of proliferation is inevitable. It already has happened. There are five nuclear weapons states (the United States, USSR, Britain, France and China). One other nation has tested a "peaceful" device identical to an atomic bomb (India) and at least seven other nations either have or are believed to want the capability to make nuclear weapons (Argentina, Brazil, Iraq, Libya, Israel, Pakistan, South Africa, South Korea and Taiwan). But managing and containing this situation, while exceedingly difficult, will still be considerably easier in a world without tons of bomb-grade materials in general use as nuclear fuels.

The United States, by setting an example with our own nuclear power program at home and by applying moral, political and economic pressure on our nuclear trading partners overseas, can still seek to build the needed global consensus to combat proliferation. The Nuclear Club Inc., will help to develop specific proposals and to educate its members and the public on how to implement them.

It would be tragic irony if a President and Congress, willing to spend unprecedented billions on defense, failed to see what a few millions and some determined leadership can buy to prevent perhaps the greatest threat to U.S. national security: the global spread of nuclear weapons.

What can I do?

Get informed, Get involved. Don't let non-proliferation die for lack of a second.

Support The Nuclear Club Inc., to get current information on what is happening in nuclear commerce and what can be done about it.

In your community, contact your Congressman and Senator, ask his views on the problem and seek his or her support for a strong non-proliferation policy directed at stopping the spread of nuclear explosives.

Support efforts to strengthen the Nuclear Non-Proliferation Act.

Support arms control and disarmament efforts, especially U.S. ratification of the Comprehensive Test Ban Treaty to help eliminate an incentive for nations to develop nuclear weapons.

Take an interest in nuclear power or research activities in your area. Inquire not only into the need for and the safety of these reactors, but into the effectiveness of safeguards against sabotage and theft. Learn whether spent fuel is being held for reprocessing into plutonium or for disposal in unaltered form.

Write to us for further information on how to get your neighbors and community groups informed and involved. In the meantime, reproduce and circulate our ad.

Proliferation is ultimately a hometown problem. Stolen plutonium can be used anywhere, including Main Street.

[From the Wall Street Journal, July 17, 1981]

PRESIDENT UNVEILS NUCLEAR ARMS POLICY AS PENTAGON CRITICIZES WATCHDOG AGENCY

(By Gerald F. Seib and John R. Emshwiller)

WASHINGTON—President Reagan unveiled a policy that attempts to reconcile his goals of opposing the spread of nuclear weapons and promoting the use of nuclear power.

At the same time, though, the Pentagon privately questioned the adequacy of the International Atomic Energy Agency, a linchpin of the President's antiproliferation plan.

Mr. Reagan declared that efforts to stop the spread of nuclear weapons will remain a fundamental foreign-policy objective. The President pledged to continue supporting international agreements and agencies designed to contain the growth of nuclear arms technology.

The Reagan policy also pledges to restore the U.S. as a "reliable" supplier of nuclear equipment for peaceful purposes. Otherwise, countries will "go their own ways" to find nuclear power, the policy statement contends, and the U.S. will have less influence on the proliferation matters.

RELIABLE SUPPLIER

However, the administration's emphasis on being a reliable supplier of nuclear technology promises to heighten the debate over the adequacy of safeguards against the misuse of atomic exports.

A major element of the current policing system is the International Atomic Energy Agency. That Vienna-based arm of the United Nations is responsible for helping ensure that nations don't divert peaceful nuclear activities into weapons-making efforts.

The Reagan policy pledges to "continue to work with other nations to strengthen" the agency; at the same time, the administration apparently plans to rely heavily on the agency to police global nuclear activities. For instance, the policy statement said that the administration will seek to have any major nuclear-supply commitments put under IAEA safeguards. Previous administrations also have relied heavily on the watchdog agency.

But government documents, which weren't released with the policy statement, indicate there is disagreement within the administration over the IAEA's effectiveness. In a paper to the National Security Council from an interagency group helping to formulate policy, the Pentagon expresed "reservations about the effectiveness of IAEA safeguards (and) the weakness of the IAEA as an international institution."

The Pentagon statement complained about the agency's "susceptibility to Third World and East Bloc politics, its lack of an intelligence capability and the limits of its scope and jurisdiction." The Defense Department warned "against undue reliance on the IAEA by those responsible for national security" within the U.S. government.

Spokesmen for the Defense Department, White House and State Department wouldn't comment.

The Pentagon's dissent promises to give ammunition to critics of the administration's policy on proliferation. After being read the Pentagon's comments, Paul Leventhal, president of the Nuclear Club Inc., a Washington, D.C.-based group specializing in proliferation issues, said: "The Defense Department has given a vote of no confidence in the IAEA, which should be seen by President Reagan as a major weakness in our national security."

Others also question whether the administration really plans to tighten international safeguards. The administration's call to strengthen the IAEA is "boilerplate, like the rest of the policy statement. It is all so vaguely worded that it doesn't mean anything," says Sen. John Glenn (D. Ohio), who has been a leading advocate of toughening nuclear export rules.

Administration officials said the nonproliferation policy is designed to assure other nations of the "continuity" of U.S. opposition to nuclear arms proliferation. The statement also is aimed at erasing the impression left by some of Mr. Reagan's campaign statements that indicated he wasn't interested in an active nonproliferation policy, officials said.

POLICY CHANGES

But Mr. Reagan's policy contains some significant departures from the Carter administration's approach.

The Reagan administration plans to shore up some allies with conventional arms as one way "to reduce the motivation" for acquiring nuclear weapons. Officials used this argument to justify the administration's recent decision to offer a five-year military aid package to Pakistan, which U.S. intelligence agencies in 1979 identified as developing a nuclear weapons capability.

The Carter administration, in contrast, pledged to stem sales of U.S. conventional arms and didn't explicitly link such sales to nuclear nonproliferation.

In addition, the administration won't oppose developing breeder reactors or reprocessing nuclear fuel for commercial purposes in countries where such activities don't pose a "proliferation risk."

This section of the Reagan policy may also prove controversial. Critics of nuclear power maintain that because the skill and materials used in breeder reactors and in reprocessing are also used in developing nuclear weapons, the two can't be separated. The Carter administration contended—and some analysts agree—that the technologies for breeder reactors and reprocessing pose serious proliferation risks because they require plutonium, a weapons-grade material.

[From the New York Times, June 21, 1981]

WILL TOMORROW'S TERRORIST HAVE AN ATOM BOMB?

Forty nations are now using or exploring nuclear energy.

The question of whether they should or shouldn't is academic; they are.

The spread of atomic weapons as a consequence, grows ominously. By 1985 those forty nations could have access to atomic bombs.

Israel's destruction of the Iraqi reactor dramatically highlights the danger.

If India has the bomb, Pakistan feels it, too, must have the bomb (and soon will).

When Pakistan has it, Libya (which finances Pakistan) could have it as well.

Iraq (supplied by the French) would soon have had bomb capacity. The Israelis destroyed that capacity, for the moment.

The great powers the United States and Soviet Union of course have nuclear arsenals, their use restrained by an uneasy balance of power.

But there is little restraint on terrorist or fanatic nations. Even less on the terrorist groups they support.

Nor is there any mystique to making the bomb.

The basic know-how is public, the process simple. All that's needed is the fissionable explosive plutonium or high-grade uranium.

And these will soon be available, courtesy of the Nuclear Industry, the nuclear states and the sieve they call "safeguards".

Then the Black Friday Group, the PLO, the FLN, the Red Brigades, Black September—any terrorist group with access to an engineer and a physicist can conceivably make its own.

A crude bomb, to be sure. A Hiroshima or Nagasaki bomb. Ten to twenty pounds of plutonium, the size of a grapefruit, smuggled in the trunk of a car and set off in Tel Aviv.

Or New York.

At that moment you can write an obituary for yourself the world you know and the people you hold dear.

This malignant scenario is inevitable—unless you and others who value life speak out for reason.

Reason bars access to plutonium or high-grade uranium in nuclear energy programs. For without these nuclear explosives you have no nuclear bombs.

THE WEAPONS CYCLE

Today's nuclear reactors are mainly fueled by low-grade uranium. You can't make bombs from this uranium. You can only make electric power.

The nuclear process, however, turns some of the uranium into plutonium in the spent fuel. If the plutonium is separated (reprocessed) from the spent fuel, you have the stuff of bombs.

One nuclear reactor can produce 500 pounds of plutonium a year. One bomb requires 10 to 20 pounds. That bomb can wipe Tel Aviv, Baghdad or Boston off the face of the earth.

NO PLUTONIUM, NO BOMBS; NO REPROCESSING, NO PLUTONIUM; NO PLUTONIUM, NO BOMBS

(A few reactors like the Iraqis' are fueled by *high-grade* uranium. High-grade uranium, like plutonium, makes bombs. These reactors can be modified to use lower-grade uranium unusable in bombs. No high-grade uranium, no bombs.)

The United States has refused to permit reprocessing of plutonium from the spent fuel. Some countries, above all France, do reprocess. Now the Reagan Administration appears ready to follow suit.

Even more, the Nuclear Industry, pursuing sales, is pushing for a new generation of breeder reactors that run on plutonium, making the most lethal element known to man available not by the pound, but the ton.

We are on the edge of catastrophe.

Only an informed and aroused public can alter the inevitable.

The United States, dominant force in world nuclear energy, must insist that nuclear energy, if it is produced, be without access to high-grade uranium or plutonium. And with effective safeguards to insure it.

WHY THE NUCLEAR CLUB?

That is why The Nuclear Club Inc. was formed. It is a "nuclear club" of a different order, not a roster of nations who have The Bomb, but a group of citizens opposed to the spread of The Bomb. It is the only non-profit, educational group working full-time on this problem.

THE QUICK OR THE DEAD

The Club includes Theodore Taylor, nuclear physicist, who designed our atomic bombs from the smallest to the largest, and Paul Leventhal, the Senate investigator whose disclosures led to abolishment of the Atomic Energy Commission and to enactment of the Nuclear Non-Proliferation Act. They know we are now faced with the choice between the quick and the dead.

The Nuclear Club Inc. has only one role. To show how the world, if it chooses nuclear energy to generate electricity, can do it without plutonium or weapons-grade uranium and without bombs.

IT IS WORTH THE STRUGGLE

It may be too late. It may be vain devotion. But if there is a chance (and we believe there is) to exchange terror for hope, and oblivion for life, it is worth the struggle.

We ask you to become charter members of The Nuclear Club Inc. We will inform you, work with you in your community, help make your voice a force for reason in Washington and foreign capitals and the Nuclear Industry.

> "The spread of nuclear weapons threatens our world and our society.
>
> "We welcome establishment of The Nuclear Club Inc. to promote public knowledge of this danger and to generate debate of technological and diplomatic means for combatting it.
>
> "Regardless of one's position on nuclear power, there is an urgent need to support a group that seeks to prevent the misuse of nuclear power for nuclear weapons. There is no problem more deserving of public attention."
>
> *Senators Alan Cranston and Edward Kennedy.*
> *Congressmen Jonathan Bingham, Edward Markey and Richard Ottinger.*

[From the Baltimore Sun]

Nuclear Watchdogs Often Fail as Bloodhounds

THE NUCLEAR RECKONING

(By Robert Ruby)

This is the second of a series of articles about the world's nuclear reckoning—about the growing imbalance between the number of nations with the ability to make a nuclear bomb and the systems by which those nations are monitored—and why those systems fail.

VIENNA.—Every year the International Atomic Energy Agency has the same comforting words: "It is reasonable to conclude," it tells its member nations, that the plutonium and enriched uranium it inspects at nuclear plants around the world can be accounted for, and that the nuclear club has not secretly grown.

But this agency can give no comfort at all, nor reasonable assurances.

Working almost entirely out of public view, the IAEA is the alarm system on which nations depend. It administers a system of safeguards—a combination of inspections and accounting checks designed to tell whether a nation is diverting nuclear fuels to make a bomb.

But this agency does not have the tools to do its job. It does not have the people or the authority. In a world where less than 20 pounds of plutonium is enough for a nuclear bomb, the IAEA has little or no knowledge of tens of tons. It is an accountant of nuclear fuels that never sees all of the books.

If the IAEA prohibited nations from stockpiling parts for a bomb, the accounting job would be hard enough. But the agency allows nations to obtain the necessary materials and expertise with its blessing, and to stop a few days short of being able to use them as weapons. As far as is known, every nation that has exploded a bomb succeeded on its first try.

To learn how the agency works is to discover that, by its own measures, it often fails. By any measure, it could hardly succeed because of political and technical facts of life. The sense of security it provides is false. There is little real comfort from an agency that conducts its business like this, without making the results public:

The 11 most "sensitive" plants inspected by the IAEA are those handling plutonium in the form easiest to use in a bomb. But IAEA Inspectors made all their regular inventories at only three in 1980, according to documents obtained by The Sun. At the other eight, the agency had to accept the countries' word about how much plutonium was there.

The agency inspects 46 research reactors that have enough fuel for at least one bomb each—including the research reactor Israel destroyed in Iraq. But inspectors last year saw all the fuel at only 20 of them.

At some reactors there are IAEA cameras to detect the removal of the fuel between inspections. But in an average year about 20 percent of the cameras fail.

If every camera worked and every inspection went well, the IAEA still might not know if plutonium was missing. This is because it does not know how much there is. Of the 86 tons the agency says it has responsibility for, 52 tons have never officially been reported by various countries. The existence of the 52 tons is only "estimated roughly" by the IAEA. The material is enough for about 6,000 bombs, the agency says.

The problems—the inherent uncertainties of the IAEA system—are dizzying. Safeguards are both a science and a religion: a science for the engineers who develop them, a religion for political figures, asking that nations accept an infant system on faith.

No matter how good it is, a safeguards agency is almost defeated before it begins. Some of the most important questions regarding safeguards cannot be answered, no matter how much time and technology are thrown at them: How much plutonium or enriched uranium, to the nearest pound, is actually in a plant with several miles of pipes? How much confidence in a measurement, in an answer, is enough?

An extraordinary agency with extraordinary support from its member countries could answer some lesser questions, but in 1981 the IAEA is not such an agency, nor do its members offer that kind of support.

By its own account, the IAEA has too few inspectors, inadequate equipment and imperfect techniques. Some of its conclusions are based on what the agency thinks it would find if inspections it cannot afford to make took place. IAEA members are trying to buy a sense of nuclear security on the cheap.

With the United States as the largest contributor, the 110 member countries of the IAEA gave the agency $25 million this year for safeguards. They gave $63 million for other work—mainly promoting nuclear energy, the same technology the agency then must inspect.

"The safeguards budget of $25 million this year—I find it inadequate," Hans J. Gruemm, the director of safeguards, said in an interview at IAEA headquarters here. "As a human being, I compare this with the armament budgets, and that's 20,000 times more. On the other hand, I have to accept the compromises defining what safeguards are worth."

Developing countries, those where nuclear plants are still to come, are "hinting that we are swallowing too much" of the budget. At IAEA meetings they maintain that helping nations develop the technology remains more important than applying controls.

To believe in safeguards is to believe that people will think and act in rational ways. It is to argue that a person will commit fewer crimes if from time to time someone comes by to watch. The IAEA comes unarmed, for it has no meaningful sanctions.

Safeguards are founded on the hope that the risk of detection is a deterrent, that a country is unlikely to make a bomb if the risk of its work's being discovered is high.

If the chance of detection is low, the alarm system will not be feared. Its value as a deterrent will be lost. At the IAEA, this has come to mean the agency's weaknesses should not be widely publicized, so that the deterrent effect is not risked. The question is how much chance of detection the agency provides, how much certainty its members are willing to pay for, how much they really want to know.

For reasons of physics and politics, the work of the IAEA is almost impossible.

To understand what it must do, think of a thickly planted corn field in June, when the ears are still hidden in the stalks.

The job of the IAEA is to count every kernel of corn in the field—if one thinks of the kernels as kilograms of plutonium or other nuclear fuels.

An inspector must count without actually entering the corn field because every country tightly restricts where inspectors can go because of its sense of sovereignty. An inspector can stand beside the field at any point or walk the perimeter, but he cannot venture down a single row.

If the use of sovereignty were resolved, the inspector still could not go far because of radioactivity. He could not safely pick an ear or pull back a leaf. Because of high radiation levels in some nuclear plants, the fuel can be measured only with remote-controlled equipment working on the hidden side of walls several feet thick.

Only 10 or so kernels—10 or so kilograms—are needed for a nuclear bomb. A half dozen ears are enough to equip a respectable air force. To miss a kernel during the count is worrisome but, under these conditions, inevitable. To miss an entire ear is much more serious. Without better tools, however, that too is inevitable.

To do better the IAEA needs more money, more inspectors and more cooperation from the countries where it works. But it's unlikely it could ever live up to the clear-cut legalistic world of the IAEA's statutes, in which safeguards work like this:

A nation and the agency negotiate detailed treaties to specify precisely what measurements the IAEA can take. The nation also sends Vienna regular reports about how much nuclear material is on hand. If there is a significant difference between the reports and what inspectors find, the agency's director-general informs his governing board or goes directly to the United Nations Security Council.

In the real world safeguards are much different.

Negotiating a treaty often takes several years, and years of quibbling follow. A good example is Japan. A country warm toward the agency, it nevertheless rejects inspectors from the Soviet Union, Israel and Pakistan. India, a country inspectors actively dislike, rejects some kinds of cameras and refuses to perform certain tests.

In the world in which the IAEA actually works, the essential reports from the nation arrive late; the average delay is about 60 days, and some information is routinely missing. Until new nuclear material is officially reported to the agency, the IAEA does not have authority to measure it, and so does not know how it is used.

When the inspectors report back to Vienna, their findings will differ slightly from the country's reports. The discrepancy will be a few grams of plutonium or enriched uranium. An agency camera will have jammed, or several pictures will come back inexplicably blurred

In the legalistic world, the agency then rechecks its figures and rushes to the Security Council if all is not right. In the real world, the figures never are all right. Findings are ambiguous because the measurement tools are imprecise.

"It is my personal opinion that a case of the director-general going to the board and saying Mauritania has diverted material is highly improbable, to say the least," said Carlos Buechler, a senior safeguards official at the IAEA.

"Neither the board nor the Security Council is going to rely on our technical statements. . . . You don't understand this agency if you think of it as a technical one. It is political."

Technical people say it is political because they know the limitations of their instruments. The political people, the diplomats, often say the agency at heart is technical because the technical goals sound achievable.

They are simple aims:

To detect the diversion of any amount of plutonium or enriched uranium, if it is enough for even a single bomb.

To notice the diversion before a country has time to put the missing material into a bomb.

The ideal is "timely detection," discovering missing material before it is used, in time for the technicians to sound the alarm, for the world to decide whether to believe it and for the diplomats to go to work.

Diversion does not require an army. It can be as simple as a hidden pipeline from a tank or replacing one of several hundred fuel rods in a storage area with a fake.

For "timely detection," the critical numbers are 8 kilograms of plutonium (just under 18 pounds), 25 kilograms of enriched uranium (55 pounds) and 10 days—but the target numbers reflect the limitations of the agency rather than the capabilities of a nation with determination.

A bomb can be made with less material, but the agency has immense problems detecting less. A dull-witted country, given enough advance preparations, can make a bomb in less time, but 10 days is the bare minimum the agency needs to interpret inspection results.

As a result, "timely detection" often is out of reach. No matter how talented, a safeguards agency confronts unsolvable problems as soon as it takes an inventory at an enrichment or reprocessing plant, two of the places where diversions are likely to occur.

In a plant with hundreds or thousands of kilograms of nuclear material, a quick count is inaccurate: A few kilograms are easily missed. Also, the inspector does not know whether the material merely was overlooked or actually diverted into a bomb.

The alternative is to count more slowly, but with such a large inventory, and given the available tools, this sometimes takes weeks. By the time the inspector learns whether plutonium is missing, the bomb will already exist.

So the IAEA has this choice: Its inventory can be timely and inaccurate, or late and precise. The system can be overly sensitive and sound a false alarm, or it can be so insensitive that it misses small clues and confirms a diversion only after a bomb has been built. In either case, safeguards will have failed.

Sigvard Eklund, director-general of the IAEA since 1961, said there had never been enough evidence of diversion for him to notify his board of governors. "We have found small discrepancies," Mr. Eklund said. "We have always found reasonable explanations."

"For the plants of today, I think we're right on the borderline of adequate," Charles Hough, an American responsible for interpreting safeguards reports, said of the IAEA's abilities.

"I think, technically, this is a job that can be done. But to get the right people, and to get it done in good time, is very hard."

An independent agency of the United Nations, the IAEA follows some of the best and worst traditions of its parent.

IAEA headquarters are brand new—two curving towers, not unlike reduced copies of the U.N. tower in New York, moved from the East River to the banks of the Danube and rising above the city's coal-induced smog.

Employees arriving in the morning by subway and streetcar are not preoccupied with mushroom clouds. Equipment people are interested in cameras; inspectors talk about wanting to travel less and see their children more; officials at the highest levels muse about solving problems by keeping people talking—Americans to Soviets, Indians to Pakistanis.

In the best tradition of the U.N., the employees come from nearly every country in the world. All of them, though, including inspectors, are hired on the basis of national quotas. Their careers are inevitably influenced by the outside world. For every Soviet promoted in the safeguards division, an American or some other Westerner usually will be promoted as well.

This used to be almost an American colony, since the agency was an American idea. An international atomic energy agency was proposed in a plan presented to the U.N. by presidential adviser Bernard Baruch in 1946 and then by President Dwight D. Eisenhower in 1953, in the same speech in which he announced the program called Atoms for Peace.

The agency was born handicapped, though. At the insistence of the Soviet Union, the IAEA could not apply safeguards unless a country requested them. In exchange for nation's agreeing to inspections, the agency also was to help them develop nuclear technology, the role that still consumes nearly two-thirds of its budget.

Some of the promotional work has proved regrettable. Between 1957 and 1976, when the policy finally was changed, the IAEA provided fellowships for the study of reprocessing. The largest number of students were Indians and Argentines. India used a small reprocessing plant to prepare for its nuclear explosion in 1974; Argentina expects to open a reprocessing plant in 1982.

The Nuclear Nonproliferation Treaty of 1968 finally gave the agency a significant role. For countries without nuclear weapons, a condition of the treaty is that they accept safeguards. Largely because of that, the agency now safeguards fuel at 737 sites in 50 countries.

"Our problem is at the moment that the risk really begins where safeguards end," said Mr. Gruemm, head of safeguards. "Knowing there are four countries where sensitive facilities exist, but not under safeguards—it is worrisome." Those four are India, Pakistan, Israel and South Africa.

Mr. Gruemm is, however, being optimistic. Under agency rules, in every country, inspectors examine fuel, not plants. A country can build a reprocessing plant but legally keep inspectors out until a report arrives in Vienna (probably late) announcing that radioactive material is there.

Under the rules, a country can keep plutonium in one building and all the other parts of a bomb next door. An inspector would be allowed only to see the plutonium. If all the fuel was present, in the agency's view the inspection would have found nothing of interest.

These are not shortcomings that can be fixed. Without exception, agency officials say the only change desired by the majority of IAEA members is to weaken the current rules, to favor national sovereignty over international inspections.

For the most part it is the developing countries that urge a relaxation of safeguards. The United States and the Soviet Union are the most adamant against it.

Safeguards have a tiny natural constituency. Only the six nations that already have nuclear weapons have a guaranteed interest in preventing their spread. The smaller the nuclear club, the stronger their authority in the world.

The optimistic view is this:

"You should look at safeguards from the eyes of the man sitting at the desk in the Pentagon—and his counterpart on the other side," said one agency official. "He sees that for $20 million, $25 million, he gets 90 percent assurance that material is accounted for."

It is said to be a bargain. For less than the cost of a single big bomber, an IAEA member can have a source of hard-to-obtain information with an official stamp. The remaining 10 percent is to be taken care of by the real spies and satellites.

"The agency erform only a certain role," said Raymond Parsick, a senior safeguards official. "Part of the role is to raise the price of making a nuclear weapon. . . . The agency can't take care of what happens in the desert."

"You see, he's out of the bottle," said Mr. Gruemm, turning a bomb into a genie. "It's impossible to bring him back. You can only buy time—delaying reprocessing and things like that."

People have to hope that every nation, every national leader, is highly moral, that none will have a temper tantrum and defy the rules by building a bomb and using it. More likely than not, safeguards won't warn other nations in time for them to decide how to stop him.

The alarm system—the inspectors and cameras and diplomats—cannot prevent an action taken with conviction. "If a state is fully determined," said Mr. Gruemm, "you can't deter it."

[From the Baltimore Sun]

MINIMAL INSPECTIONS BEGIN IN UNITED STATES

(By a Sun Staff Correspondent)

You will not see an International Atomic Energy Agency inspector in the Soviet Union. Until April, you would not have seen one regularly in the United States—because some countries are slightly more equal than others under the Nonproliferation Treaty of 1968.

The treaty does not require safeguards in countries that exploded a nuclear bomb before 1968. Considering the IAEA's limited resources, there is thought to be little profit in looking for one more nuclear bomb in nations that have thousands on hand.

The United States has asked inspectors to come, however, because of a deal made when the treaty was negotiated.

The agreement was with West Germany and Japan, who wanted proof that safeguards would not interfere with the operation of their power plants. In exchange for their ratifying the treaty, they demanded that the United States have inspections much like everyone else.

It took 14 years to agree on the details—until December 9, 1980, when a treaty between the United States and the IAEA went into effect.

It allows inspectors to visit operating nuclear power plants from Arkansas 1 to Zion 2, power plants under construction, several fuel fabrication plants and dozens of research reactors (including one at the University of Maryland in College Park).

The inspectors are not allowed at most government research reactors, any of the reactors producing plutonium and enriched uranium for bombs, or any of the plants that fabricate bombs.

For the IAEA, the new inspections are a mixed blessing. "If the agency had to cover all the U.S. facilities, it would have to at least double the number of inspectors," said Frantisek Klik, who supervises half of the agency's inspections. The IAEA instead chooses "some facility where the agency could learn something."

This year, two power plants in California and one that fabricates fuel in the state of Washington were inspected.

[From the Baltimore Sun]

THE INTERNATIONAL SAFEGUARD SYSTEM—NUCLEAR CHECKS ARE DONE PLEASANTLY

(By Robert Ruby)

THE NUCLEAR RECKONING

This is the third of a series of articles about the world's nuclear reckoning—about the growing imbalance between the number of nations with the ability to make a nuclear bomb and the systems by which those nations are monitored—and why those systems fail.

BERN, SWITZERLAND.—We are sitting in a small office at the nuclear power plant, and watching the inspector from the International Atomic Energy Agency with growing alarm.

"Really, I am confused," the inspector says, the only person smiling. According to the records, some enriched uranium is missing. He has added up the numbers three times, and every time they come up short.

This should be the IAEA at its best, the international accountant of nuclear fuels tirelessly unraveling records to pinpoint the location of the smallest amounts of nuclear material.

One imagines an inspector to be relentless and calm, to be a visitor held in the highest regard at every plant. He is the one proliferation control that can ask questions face to face—the human part of a confidential system that is supposed to save nations from anxiety over whether their neighbors are making a nuclear bomb, so they won't take that step themselves.

By design, the IAEA safeguards system rarely can be observed, so that its findings—and knowledge of its weaknesses—don't travel far. This is the system at work, during an inspection in June, as two executives from the power plant and a Swiss government official sit in the office, at a long table cluttered with papers, and listen and watch.

"Now here, in March and April, there were a lot of shipments—seven, yes. Then you have received, mmmm, 68. Then you have another 5, mmmm, so this is today's inventory—68 and 5 is 73." Seventy-three new fuel rods containing hundreds of thousands of grams of uranium, according to the reports on the table—but 25 grams less than what the reports sent to the agency said.

An inspection focuses more on paper representations of nuclear fuel than on the real thing. Twenty-five grams would fill a few thimbles; they are lost on paper and will have to be found on paper, without being seen.

"Is not easy," says the inspector. He is apologetic. Surely the mistake is his. So the executives join him with their own calculators and call out the numbers as if this were a game of bingo.

They get the same result.

It doesn't take long for a dark reverie to begin. Was the uranium stolen by the government or terrorists? While in transit or from the plant? Is there a secret nucler bomb being assembled somewhere?

The unreconciled numbers mean, the inspector says, there is a typing error.

A strong sense of unreality intrudes.

If the reports show uranium to be missing, the reports must be wrong—or so it is concluded. They are 25 grams short because the wrong number was recorded—even if no one knows precisely where. Officially everything has been resolved.

"Sorry," one of the executives says, smiling now. "It was our error. It's nice to have you here—to have you find something."

So goes an inspection, a diplomatic exercise of approximation rather than precision, a matter of coaxing a country to allow a few imperfect measurements to be taken in a rush.

This inspector was almost certainly right about the 25 grams, but in any case the system does not allow him to do much better. The credibility of safeguards turns out to be based as much on the inspector's mere presence as on what he does; nations have to depend on the idea of the performance.

The inspector has a lonely job of uncertainties, of not being able to pinpoint a typing error because there are other things to check, because this happened near the end of a tiring day; because another inspection begins early tomorrow; because, after all, 25 grams is an insignificant amount. The scientific system turns out to be altogether human.

His title is inspector, Central and Northern Europe section, Department of Safeguards. Alberto Lumetti, 46 years old, is big and florid and could not be friendlier.

It's hard to know what the utility executives think of him. He wears suspenders plus a belt, but his well-worn pants seem to be falling down. He apologizes profusely for imagined slights. He is red-faced and sometimes frantic.

He is not imposing, and maybe that is how an inspector should be. He can find a discrepancy of a few grams of uranium without making anyone mad. If an inspector is not technically a diplomat, he must be diplomatic.

Mr. Lumetti is typical of most inspectors except for the fact that he has stayed at the IAEA 13 years—three times the average tenure. Inspectors don't stay long, some of them say, because the shortcomings of both the IAEA management and safeguards defeat them.

Most of the Westerners have backgrounds like Mr. Lumetti's, who came from the Italian atomic energy commission. They are engineers and chemists from government agencies, engineering firms or universities.

Most are at the agency because they believe in nuclear technology rather than fear the spread of nuclear bombs. They come to the IAEA when nuclear development slows in their own country, when there is not a good chance of promotion.

Even before they arrive at the agency's headquarters in Vienna, they can pick up hints of its management style. The IAEA hires inspectors without seeing them. The agency sees a resume and sometimes a photograph, forwarded by a government.

It also knowingly hires some inspectors who are virtually useless—because politics seems to demand it. Some simply do not have the expertise, and are taken on because of national quotas set by the United Nations for every job.

Inspectors from the Soviet Union are a special case, people who have expertise but the wrong politics. Some Soviet inspectors have waited as long as nine months in Vienna for an assignment, because most countries refuse to admit them.

No inspector is a stranger, because long before an inspection his resume is sent to the country he visits. No inspection is truly unannounced, because inspectors must apply for visas and countries have the right to have an official accompany them.

Whomever the agency proposes to send, a country can reject him without explanation, bounce the first substitute, the second and continue so indefinitely. In theory the proposals and rejections must be made in writing. In practice, this is an entirely private business, in the hope that nations will continue to tolerate the idea of safeguards, if not every particular. According to the official records, the IAEA is distinguished by never having a disagreement with its members.

The party hurt most by this is the agency. By the end of 1981, the agency expects to have 146 inspectors, compared to the 187 it needs, according to an internal report.

Of these 146, only 115 will be both technically and politically acceptable for travel. As a consequence, some inspections will never be made, as has occurred in the past. In 1980, according to the report, the agency didn't perform more than a third of the authorized work.

If there were a surplus of inspectors, there would still be a shortage of useful tools. Even for an accountant, the current equipment is modest—seals, cameras and counters.

A seal is disarmingly simple: a metal cap in two parts, plus a wire that can be cut to length. The cap is closed around the knot of the wire, after the inspector ties it tightly around whatever he chooses—for example, a box of new fuel. It's presumed that no one can untie the wire without destroying the seal, which would be noticed by the inspector.

A spy would have nothing to do with the cameras—super 8 movie units, no more compact than what is available in any photo store, but altered to take pictures at preset intervals. Cameras are left in a plant and typically aimed at old fuel rods or a crane necessary to move them, to record any change. An inspector either develops the film at the plant or takes it back to Vienna.

The counters are tuned to invisible waves and invisible particles which are the signatures of radioactive elements. They tell the inspector whether the box labeled uranium actually contains plutonium, or the proportion of U-235 to U-238, the two forms of uranium used in a power plant.

None of these tools is problem-free. There is, for example, a lively dispute about seals. According to officials who have seen it, a film made by Brookhaven

National Laboratories in the United States shows a seal being opened and reclosed in what might be an undetectable way. After arguments in Vienna over whether the agency really would have been fooled, the seals were slightly modified.

The cameras are, unfortunately, like all other cameras: Inspectors forget to focus the lenses, film jams, electronic timers lose their inner clocks.

The best counters are bulky, in some cases too large to leave Vienna. For the most precise measurements, small samples of radioactive material must be brought back to the laboratories, where backlogs mean tests cannot be completed for months.

"I feel very uncomfortable as a scientist," says John Womack, an inspector who is leaving the agency this month after three years to return to the United States.

"I'm used to precision. Maybe once, twice, in 2½, 3 years I've had an instrument I had confidence in, and put it up against something it could measure."

Indeed, the tool that inspectors use most is a set of binoculars. In their many safeguard reports, and in the course of dozens of interviews, agency officials never volunteer the fact that without binoculars inspectors cannot do their jobs in the time available.

They aim them to count used fuel rods, boxes of new fuel, or drum after drum of newly enriched uranium or waste—sometimes opening none.

"I feel very stupid sometimes, just counting them," Mr. Womack says, "but that's all I have time to do."

"I feel like I'm an actor on a stage. I know what I'm going to say to them. I know what they're going to say to me. . . . They know an item count doesn't make sense—but they make a great show of keeping a serious face and so do I."

Eventually this becomes clear: The IAEA is prepared only for inspections that find nothing significantly wrong.

Small problems—a discrepancy of 25 grams of reactor fuel—usually can be resolved or have few consequences. But no one knows precisely what to do if tens of kilograms are missing. The agency is no more eager for such a surprise than its member nations are, because the agency can hold their trust only as long as nations think they know how the agency will act.

An inspector's job, according to the agency, is not to reach conclusions. An inspector is supposed to collect information and leave the interpretation of it to headquarters.

If he finds every camera stopped and every seal broken, his job is to fix or replace them, and not necessarily to call for advice. The system is designed around hopes that nothing will be found. Safeguards may be acceptable only as long as they are not a threat.

"We are not detectives," explains Uldis Barda, an inspector from Australia. "We are not running around looking behind doors."

"Your basic question is what do we do. Well, I don't listen to rumors."

"If the worst happened," says Mr. Womack, "I'm just going to play it cool and pretend I didn't see a thing. I just want to get out of the facility, because there are a hell of a lot of accidents that could happen to you in a place like that."

Mr. Lumetti is driving his Opel cautiously. We are dropping down, down, down the lazy switchbacks of the road, past dairy cows and compact fields, to the nuclear power plant called Muehleberg.

It is a humming, hissing star among nuclear plants, the most reliable boiling water reactor in the world, according to the statistics. It is a squat concrete cylinder on the banks of the Aar River, and the site seems manicured.

Mr. Lumetti has been here 20 times for inspections, and knows the people by sight. There are handshakes all around over coffee. Mr. Lumetti, who drove to Bern from another inspection the previous night Kurt Imhof, an official observer from the Swiss federal energy office; Georg Markoczy, director of technical services at the power plant, and a reporter who was given permission by the IAEA and the Swiss government to observe.

Mr. Lumetti is not a suspicious sheriff riding up to the ranch. People indulge him rather than fear him; he is alert but not stern. He mutters to himself. In the corridors he draws only a glance.

It's 9:30 a.m. when Mr. Markoczy glances at his watch and asks Mr. Lumetti what he plans to do.

"The usual," Mr. Lumetti says, "I service the cameras, I check the seals. I understand you have some new fuel elements."

To see them we have to take off all our clothes. Company underwear, company socks, company overalls and company shoes are required.

People work at a deliberate pace at the best of times at a nuclear plant, to avoid inadvertent exposure to radiation. But today everything is extra slow—the IAEA equipment must go into sealed plastic bags, all the visitors need identity cards. And after reaching the next floor, everyone has to change clothes again—another precaution.

It has taken, in all, an hour to get this far. But Mr. Lumetti now is carrying a suitcase into a perfectly circular, almost perfectly clean room. Everyone is wearing yellow overalls and paper hats that make people look like disheveled chefs.

We are walking on the lid of a giant steel tea kettle—the reactor's top, where a few feet below temperatures just now are 500 degrees. The floor is warm to the touch. This is the heat that becomes electricity for the milking machines at the farms and for the parliament building in Bern.

One of the agency's counters is in the suitcase—a fat tube connected to a box with dials, and a tiny red screen where numbers appear. Aim the tube at new fuel and after a brief snowstorm the percentage of U-235 appears on the screen.

From what people at headquarters say, one would think this work is as delicate and precise as a surgeon's, that the confidentiality of records is defended at all costs, that the sanctity of the information is such that an inspector can't trust any part of his job to an outsider.

One would be wrong.

Mr. Lumetti can't check the fuel, service the IAEA cameras and glance at the records in the office downstairs by himself—not if he wants to get to another inspection tomorrow.

Mr. Imhof, the Swiss government man, has been through this before. Gradually he takes over. Within 15 minutes, he is aiming the counter. Within 20, he is both aiming it and recording the figures from the screen, the numbers that will become confidential once they get to Vienna, so Mr. Lumetti can do something else.

The inspector is making a sweaty climb to get to one of the most spectacular views in Switzerland—as much of the guts of a nuclear plant as a person can safely see.

The IAEA could not have picked a better place for a surveillance camera. It is starting at the pool of old reactor fuel from a narrow catwalk that almost bumps the ceiling, a tiny platform no worker should ever have a reason to visit.

Mr. Imhof is visible through the lens. On the platform Mr. Lumetti talks continuously. "I take the film. I put the film here." Nothing should be done without first telling Mr. Markoczy. Nothing should be a surprise.

Mr. Markoczy, in his mid-40s, is reserved and slow to speak—what Mr. Lumetti is not. He has worked at Muehleberg only a short time but probably has a better technical background than anyone else here. He lets Mr. Lumetti work without saying a word.

An inspection? "I wouldn't say it's a good thing—we could do without it," he says. "It just means two men are taken out for a day or two" to watch the inspector.

"The camera doesn't bother us because nothing's been going on here." As for Mr. Lumetti, "He's very welcome—he's also a very nice guy."

"So," Mr. Markoczy says to him a few minutes after noon, "was it a hard morning?"

"No, regular—dressing and undressing."

Everyone dresses for lunch, undresses to get back in, and it is almost 3 p.m.—and there has been no more than two hours for work. The first stop of the afternoon is a small office.

Over the next hour, it's here that Mr. Lumetti, adding page after page of closely type numbers, comes up short 25 grams of enriched uranium. Mr. Imhof unaccountably looks bored. Mr. Markoczy's interest grows by giant leaps, until he moves to Mr. Lumetti's side.

"The report will show there is no discrepancy," Mr. Lumetti says as the papers are cleared away, "only a typing error."' He apologizes profusely.

For the last stop, the little group returns to the top of the reactor, where the inspection is reduced to a counting game a child could play.

Mr. Lumetti wears his binoculars and focuses on used fuel rods at the bottom of a deep pool of water which radiation has turned Mediterranean blue. He counts "one, two, three," counting fuel rods that between inspections could have been replaced by fakes—but almost certainly have not.

But by counting he can't know. Not able to do better, the IAEA gives the utility the benefit of every doubt.

Now he focuses on their serial numbers to check them against the records, numbers that between inspections could have been faked—but almost certainly have not.

But by counting, by the IAEA system he can't know.

At 6:15 p.m., the inspection becomes what a civics book would suggest. Everyone is shaking hands at the outside gate. The inspection is over.

"I hope we did not disturb you too much," says Mr. Lumetti. He will return in August, when the new fuel is loaded into the reactor. "We took maybe a half-hour too much."

Mr. Markoczy smiles. "It was my pleasure."

[From the Baltimore Sun]

REPROCESSING PLANTS DIFFICULT TO POLICE

(By a Sun Staff Correspondent)

VIENNA.—It took only one truck, carrying plutonium in a lead shipping cask. In a race against an agency that announces its arrival weeks in advance, no one had to rush.

The truck traveled the short distance from where the fuel rods are made back to the reprocessing plant, to deliver a stand-in for plutonium that had slowly been dripping into hidden tanks.

This had been thought about for years. The tanks were installed when the plant was built, long before the first inspector showed up.

The inspection went fine, of course. The manager took the inspectors to a long, merry lunch. They had to rush through their work.

Eventually the agency telephoned, but not about the reprocessing plant. It wanted to schedule an inspection at the fuel plant. Fine, fine. Everything was ready. The truck had taken its special shipment back long ago.

The sequence of events probably hasn't happened yet, but the International Atomic Energy Agency worries that it will. A reprocessing plant, the most mixed of the blessings of the nuclear age, is where IAEA safeguards are needed most and where they are least likely to work.

There is no process more desired by countries hoping for a new source of energy, no better place to get material for a bomb, and no system harder to police.

Reprocessing is what brings plutonium into usable form. Old reactor fuel is chopped up and chemically separated so that at the end of the plant there are three spigots—for plutonium, old uranium and intensely radioactive wastes. For an IAEA inspector, there is no worse place to be among the different kinds of nuclear plants.

He confronts a paradox: The raw materials of reprocessing can sometimes be seen, but never precisely measured. The amount of plutonium in old reactor fuel can only be roughly estimated before it goes into the plant. At best, the estimate will have a margin of error of 10 percent.

From that moment, precise measurements—the heart of safeguards—are impossible. An inspector who does not know how much plutonium goes in cannot be certain if it all comes out. He cannot know if the operator has a hidden pipeline diverting small amounts to a stockpile within the plant for a future bomb.

A sense of certainty never returns. As the months of operation go by, plutonium, fraction of a gram by fraction of a gram, finds its way into cracks and crevices, accumulates in pipes, on shipping containers and on equipment.

Enough becomes trapped so that if 100 kilograms go in, only 99 come out. Or a new shipment knocks free some of the material trapped in the past—and 101 kilograms come out.

These small, cumulative differences are called MUF—Material Unaccounted For. It is MUF which makes possible the regular, clandestine theft of small amounts.

"MUF can be made big. It can be fiddled with," said Theodore Taylor, an American physicist who designed nuclear weapons and is a safeguards expert.

"There are all kinds of things you can imagine. If a country wants to divert material, it can start running a sloppy operation. Get the inspector used to seeing big MUFs. And under that cover, they can divert material."

"Unless you catch the guy red-handed," and R. Gerald Paige, a safeguards official at the Nuclear Regulatory Commission, "you're not going to know if it was theft or if it's just in the pipes."

The IAEA's record at these plants is dismal.

In 1980, according to a report the IAEA has not made public, the agency could not pry MUF figures from at least one country (which is not named) or calculate the figures on its own. The agency thus does not know how much plutonium was there.

In theory, there is a way to determine whether all the plutonium goes where it should, whether there is a hidden pipeline. But according to the report, the test "is still being performed on an unsatisfactory scale, due mainly to shortage of manpower and lack of suitable measurement methods, and continues to represent a major problem. . . ."

"We have some countries where the record systems are relatively primitive," said an agency official familiar with the report. "We are really doing the books for them. Where we have difficulty is with large plants, and with the large plants to be built by the end of the decade."

Those will almost certainly be in Great Britain, France and Japan, which already use reprocessing on a limited scale as a source of reactor fuel. Other large plants may be built in India, Pakistan, Argentina and Brazil.

Some of them will be "a very, very severe problem," but fortunately are several years away, according to a former IAEA inspector now at the State Department. "The whole thing has slowed down to a pace where we can try to keep in step with it. That is not to say it is not going to be a problem.

"The problem has been delayed."

Senator CRANSTON [presiding]. Thank you very much.

Who will be our next speaker?

Mr. MORGAN. I will defer to Mr. Shea.

TESTIMONY OF DR. THOMAS E. SHEA, FORMER SAFEGUARDS ANALYST AND INSPECTOR, IAEA, AND VICE PRESIDENT, INET CORP., SUNNYVALE, CALIF.

Mr. SHEA. Thank you, Senator.

Senator, I was with the International Atomic Energy Agency from March 1977 until July 1981. I joined the Agency as a first officer in the Systems Study Section in the Department of Safeguards and in July 1979 was promoted to senior officer in that section. I remained at the Agency a total of 4 years and 4 months, leaving this last July to start a business.

My service with the Agency was such that I had an opportunity to contribute to solving a wide variety of problems ranging from generic policy issues to very specific problems concerning the implementation of Agency safeguards at specific facilities throughout the world. I would like to mention three areas of particular involvement.

First: The Agency's Deputy Director General for Safeguards is advised by an internal technical review group on matters related to safeguards documents under negotiation, especially subsidiary arrangements and facility attachments. I was privileged to represent the Division of Development during the 4 years that I was in that particular group, and was involved in the safeguards attachments for research reactors in Iraq, including the Osirak or Tammuz reactor, and in Libya and various other countries; for the reprocessing facility in India and in Japan; for fast critical assemblies with large plutonium or highly enriched uranium inventories in Germany, Japan, Switzerland; and for plutonium and highly enriched uranium fuel manufacturing plants in Belgium, Japan, Germany, Canada, and Argentina, and a variety of other facilities as well.

Second: During my service, I represented the Agency's Secretariat in all meetings with its Standing Advisory Group on Safeguards Implementation [SAGSI]. That group is the senior advisory body for safeguards, advising the Director General on matters related to technical criteria and various generic issues associated with safeguards implementation. I was responsible for preparing most of the policy papers during that period, and argued the Secretariat's views, on occasion with success.

Third: In addition to my duties within the System Studies Section, I was a designated inspector in the Euratom countries and participated in seven inspections during that period. Two of those were physical inventory verification inspections at the ALKEM plutonium fuel fabrication facility; the remaining five were inspections at large power reactors. Participation in these inspections is undertaken by Development staff to provide improved understanding of practical problems routinely encountered by the operations staff.

Looking back over my participation with the IAEA safeguards program, I formed some observations which I would like to share with you.

First: I believe that fundamental improvements have been made in the technical effectiveness of IAEA safeguards in the period since 1977. The requirements are more clearly specified, the equipment more efficient and more reliable, staff levels have increased some fourfold, and the staff is far more professionally trained than in the past.

Second: In efforts to improve safeguards effectiveness, the United States has always been in the forefront. While I strongly encourage the continuation of these efforts, I am certain that members of the IAEA Secretariat would welcome probing inquiries and demands for improvements coming from other lands. It is not that we are alone in our concerns as Americans, but all too often the interactions with other countries are limited to diplomatic platitudes without action, particularly in terms of meeting the obligations defined in the respective safeguards agreements.

Third: I am of the opinion that IAEA safeguards work. I am not aware of any undetected diversions of nuclear material, at least during the period from 1977 to mid-1981. The safeguards system seems to provide a set of norms for national behavior, and on the whole, countries wish to work within those norms.

I believe that the wider the system becomes, the tighter the bonds become and the chances for continued success improve. I might say the problems of nonproliferation seem principally to be the materials and facilities which are not under safeguards rather than those subject to IAEA safeguards.

Fourth: It has always struck me that the Agency was very conscientious in maintaining a balance. On the one hand, it must satisfy its member States that the conclusions and assurances it provides are credible, especially when it reports that no diversions have occurred. On the other hand, the system is known to be imperfect: the Agency must keep the support of its sponsors, without unjustified claims, hinting strongly enough at its deficiencies to provide the driving force to improve those flaws. I do not think even one member of the technical staff of the IAEA would consider the existing arrangements satisfactory; most would agree that progress has been made, however, and that further improvements are in the works.

Deficiencies remain in the nature of the Agency's agreements and in the manner in which the countries and the Agency carry out those agreements. Some of those deficiencies may be addressed through legislation; some have to do with the behavior of sovereign States and may be responsive to diplomacy.

I wish to conclude my statement with one final observation. An organization like the IAEA, chartered to care for an important problem, can only succeed if its mission is explicitly defined, if it is provided with the necessary wherewithal and is held accountable for its actions. The most substantive improvements occurring over the past 4 years have resulted from the requirement imposed on the Secretariat by the IAEA Board of Governors that the Secretariat submit an annual Safeguards Implementation Report. This requirement has resulted in a clear definition of the minimum requirements necessary for the safeguards applied at each facility, in standardizing the safeguards for similar facilities between the regional sections, and for providing a clear definition of outstanding problem areas. The IAEA inspectorate is held accountable for their activities to a much greater extent than before.

The Agency has been telling the international community in the safeguards implementation reports that it has serious problems. In 1980, I think the IAEA was only able to provide 42 percent of the inspection effort considered necessary at that point in time. It is the responsibility of the community of nations to support the IAEA and to increase the resources available to the IAEA to the point that is necessary.

I would like to make one final observation before I close: in all the discussions today we seem to have a black-and-white type of perspective, that either safeguards are effective or not effective. It is not at all clear to me how the Nuclear Regulatory Commission can determine on the basis of their evidence that IAEA safeguards are ineffective to the point that they would consider suspension of exports. I think that in all types of facilities there is some possibility for detecting diversion, and that the detection time and sensitivity, the ability to detect diversion would depend upon the quantity of material diverted and on the diversion strategy and concealment scheme that would be used as a method for actually acquiring that material.

There are certainly problems in applying effective safeguards in large facilities and in states with extended nuclear industries, but I think that there is reason to hope; by focusing on inefficiencies in a way that is constructive, further motivations and further improvements will result.

Thank you, Mr. Chairman.

[The following letter was subsequently received for the record:]

INET CORP.,
Sunnyvale, Calif., December 15, 1981.

Hon. CHARLES H. PERCY,
Chairman, Committee on Foreign Relations,
U.S. Senate, Washington, D.C.

DEAR SENATOR: I want to thank you for the opportunity to testify at the Committee Hearings on December 2, 1981, delving into the effectiveness of the nonproliferation safeguards administered by the International Atomic Energy Agency. Many important considerations were brought out, which will be of unquestionable value in efforts to strengthen the existing non-proliferation regime in general, and the IAEA in particular.

It is clear that the current level of IAEA safeguards effectiveness is inadequate to provide the non-proliferation assurances we seek. This appreciation is, in itself, an essential prerequisite to improvement. But recognition within the United States is not enough: that appreciation must be widely shared within the international community before substantial improvements can be brought into effect.

Having established that a problem exists, what might be done to bring about improvements? Some suggestions have already been expressed; of those, some will succeed, some will meet with considerable resistance within the IAEA and within the international community. In the interests of improving the effectiveness of IAEA safeguards, in the following paragraphs I submit a number of additional possibilities, intended to augment the list of those already identified. On the basis of my IAEA service, I believe each would contribute improvements, and each could be accommodated within the existing framework of international agreements.

(1) Questions have arisen regarding whether or not the Osirak (Tummuz) reactors were intended to serve a legitimate peaceful purpose. One possibility to allay future concerns of this nature might be to expand the authorities granted to the IAEA, to make a determination regarding each project initiated within a state, or each international transfer, that the declared uses are consistent with accepted patterns of peaceful nuclear development, appropriate to the state at the time the project is proposed. It would be necessary to reach international agreement on normal patterns of peaceful nuclear development, and to grant the IAEA the authority and responsibility to express its approval or disapproval before any such project is consummated.

(2) If we want the IAEA to improve, to perform a vital mission for us, and we want to use their activities in something as direct as U.S. export licensing, in fairness we must tell the IAEA precisely what we expect, make certain they are given the wherewithal to do what we want, and then, then we must hold them accountable for meeting our needs.

The IAEA is in the process of adopting an evaluation scheme for judging the effectiveness of its safeguards. Using that scheme, minimum performance targets could be identified for each type of nuclear material subject to IAEA safeguards. The IAEA could then plan its programs and measure its progress in terms of meeting those performance targets. Serious consideration should be given to organizing U.S. assistance efforts in relation to that framework.

(3) Within the United States, we have experts able to define the inspection activities which should be adequate for the IAEA to implement effective safeguards. One means to provide assurance that U.S. interests would be served in any export would be to provide the IAEA with a detailed description of the minimum safeguards considered necessary, granting approval for the export only when the IAEA had acknowledged its agreement to implement its safeguards in accordance with that description (or some mutually agreeable alternative). Such a description would include the basic approach to be followed, the equipment to be used, the schedule of inspections to be performed, the inspection activities to be undertaken on each inspection, descriptions of the anomalies which should be detected in the event a diversion occurs, and a list of follow-up actions which should be undertaken in the event anomalies are detected to establish whether or not a diversion is suspected.

(4) Working with other members of the international community, we should help the Agency to be capable of being more effective. Consider the following:

There just aren't enough inspectors.—Listen to what the IAEA is telling us in its annual Safeguards Implementation Reports. For example, they say that they need at least twice the number of inspectors now than they had in 1980 to be able to provide the minimum coverage necessary. Note that the basis they use for reference is not agreed as the minimum necessary; rather, reference is with respect to the numbers negotiated in facility attachments, some old, some new. The actual figures are likely to be considerably higher.

A lot of facility attachments are out of date.—The Agency should review all of its facility attachments to ensure that the provisions allow the Agency the opportunity to satisfy their own criteria. This activity would not require a very great effort and would at least assure that safeguards are being applied on an equivalent basis.

Improve personnel selection.—The Agency is currently not able to interview candidates before selection, and can't get rid of its duds before the contracts expire. Improvements could be brought into effect by more active recruiting (e.g., direct mailing to all nuclear establishments, plus expanded advertising in appropriate journals), pre-employment screening. . . . Within the United States, we might take more of a lead to prepare candidates for IAEA employment, especially those from developing countries, having them take intensive training at Los Alamos and Sandia laboratories, for example.

Improve inspector support.—There isn't enough help within the Agency, and many times it does not appear to be well directed. This is especially true in the support given by the information treatment division. The emphasis must shift to supporting the inspectorate with applications programs and an adequate number of data processing specialists to help make important information available, to make the information system slave to the inspectorate, rather than vice-versa.

Inspectors shouldn't go out alone. Ever!—Even inspections at simple facilities should be undertaken by a team, minimum size: 2! Inspectors face a crowd of people from the facility and from the national authority. They are subjected to scrutiny, questions, the hardships of extensive travel often under trying conditions. I believe that the current policy is an unwise economy which can only lead to poor morale and ineffectiveness.

Build inspection teams to cover the required tasks.—Some progress has been made in this direction, but more should be done. The lead inspector must be technically competent and well trained in matters related to diversion, verification, and the rights and authorities of the Agency and of the state. The inspection team should be made up of junior inspectors and nonprofessional inspection assistants trained in making measurements, applying seals, auditing accounts, etc., performing these needed tasks under supervision while relieving the lead inspector to marshal the information necessary to derive the conclusions required, and to investigate anomalies, preferably as they are identified.

Improve inspection quality assurance.—Further efforts are needed by the IAEA to improve the manner in which inspections are planned and conducted. One means to improve planning would be to help the Agency formalize its inspection planning, briefing and de-briefing, perhaps using the procedures adopted in the Agency's Euratom Section as a model. As a means to improve the quality of inspections, the Agency should create a team (or teams) of senior inspectors to accompany regular inspection teams to determine the adequacy of the safeguards approach and critique the inspections. Such a group should be coordinated through the Safeguards Evaluation Section.

Establish an anomaly review group.—At present, anomalies are defined somewhat differently in the six regional sections, and the follow-up actions undertaken are not standardized and not controlled. An effort should be made to reach a common definition on just what constitutes an anomaly, and what actions should be taken to determine whether or not a diversion may be indicated. The anomaly review group should be given sufficient authority to recommend special inspections where appropriate, and to suggest (order?) facility operators to take the actions necessary to bring about the prompt, unambiguous resolution of outstanding anomalies, once identified.

Get the Agency to report more.—For example, the Agency could report the details of the anomalies it detects (currently on the order of 200 per year), especially those that remain unresolved. They needn't be keyed to specific facilities or states, and thus this information could be provided under existing disclosure arrangements. Perhaps the Secretariat should make a report at each and every Board meeting, describing the unresolved anomalies and the means used to resolve those which had been attributed to innocent causes.

Improve reporting timeliness.—The current reporting scheme requires delays (e.g., transactions are reported by month, a month after they occur—at best), and is hopelessly cumbersome. Commission a study to recommend adoption of reporting based upon telecommunications links, expanding on the "recover" project work.

Provide guidance to States on the basics of nuclear material accounting and control.—Agency inspectors are presented with a mind-boggling mishmash, which they must struggle to understand. Generally this isn't the result of any mischievousness, rather, no guidance is available and entropy triumphs. The IAEA issues a extensive series of safety guides suggesting how states should regulate siting, construction, operation, . . ., features pertaining to nuclear facilities—some efforts are certainly needed in records keeping, inventory taking, error estimation, . . . to improve the basis on which safeguards are built.

(5) For effective IAEA safeguards, the United States must continue to support the IAEA directly and continue the Program of Technical Assistance to the IAEA. Without the former, there is no IAEA; without the latter, there is no hope for improvement.

(6) More concern must be given to the human factors aspects of IAEA safeguards, especially to attitude formation, vigilance and motivation. Some of the items noted above might help in this regard, and one other possibility comes to mind. Just as a football team is more likely to win when the crowds are cheering, we should expect the IAEA staff to be responsive to the support and encouragement of its member states. Further effectiveness could be gained through simple steps intended to reinforce the sense of importance, the concern and support felt within the community. For example, why not gather the entire safeguards staff together in a big room with the Agency's Board of Governors, and have them express in person their support. Of all the recommendations above, I suspect this one would be most cost-effective. Challenge the staff to improve, and provide the climate where improvements are eagerly sought and rewarded. That will help.

The United States is at the forefront of virtually all improvements in the effectiveness of IAEA safeguards. We can do more, especially in the sense of demonstrating how things should be. The application of IAEA safeguards in the United States, especially at the Exxon fuel manufacturing plant in Richland, Washington, is an example of the best kind of leadership we can provide Under the current terms of the U.S./IAEA safeguards agreements, the IAEA will shift its safeguards to another facility in another year, and the IAEA will no longer be able to derive the full and very positive benefits of this effort. Some arrangement should be created to continue this arrangement as a base for advanced training and demonstration.

Also, we could extend our activities in demonstrating how things should be. The Allied General Nuclear Services Company, operators of the Barnwell Nuclear Fuels Processing Plant have proposed an extended test of the implementation of international safeguards at their reprocessing facility. The tests would not (in the first year) include actual use of spent fuel and no plutonium would be processed, but even with these limitations, that facility represents the state-of-the-art in reprocessing safeguards technology, and the proposed experiments would contribute to further improvements. Serious consideration should be given to funding that experiment, with the active participation of the IAEA and open to all interested nations of the world.

If the human species is to survive, international accommodations must one day evolve which will allow life free of international conflict. Existing nuclear arsenals may then be allowed to deteriorate into disuse, without replacement. We must hold the world together until that time, for as many decades or centuries as it takes.

The Treaty for the Non-Proliferation of Nuclear Weapons, and the safeguards applied by the International Atomic Energy Agency are vital to preventing the spread of nuclear weapons. Every effort must be made to gain acceptance of the NPT by all nations, and to strengthen the bonds that unite the NPT community. There are very few holdouts—each should be examined to identify the steps needed to gain that country's acceptance. We should be prepared to offer incentives, pressures, security alliances; we should, if need be, be prepared to acknowledge the nuclear weapons capability of nations which are not currently enshrined in the NPT as "weapons states."

As new goals and priorities are established for the IAEA, the following points should be recalled: No case has ever been shown where IAEA safeguards have failed—where a nation has developed nuclear weapons under the ruse of false participation in IAEA safeguards, or by escaping detection; view this unique undertaking in concert with the intrinsic value of international verification, with diplomatic initiatives to reduce incentives for proliferation, and bearing in mind that perfection can never be achieved, define these new goals to give measurable improvements.

With every wish for success in this effort, and all due respect,

THOMAS E. SHEA, Ph. D., *Vice President.*

The CHAIRMAN [presiding]. Thank you very much, Dr. Shea.
Mr. Morgan.

STATEMENT OF EMANUEL R. MORGAN, FORMER INSPECTOR, IAEA, AND FORMER EMPLOYEE OF THE NUCLEAR REGULATORY COMMISSION, GAITHERSBURG, MD.

Mr. MORGAN. Thank you, Mr. Chairman, for the opportunity to testify before this committee to effectively safeguard nuclear material. A sober evaluation of the actual effectiveness of IAEA safeguards bears heavily upon vital nonproliferation and international security issues.

I worked 15 years in the private, public, and international nuclear sectors in the area of safeguards of nuclear materials. Throughout that 15-year period in the field of nuclear material safeguards I was neither an advocate nor an opponent of nuclear energy. I am testifying as a private citizen since having left NRC last summer to go into private business, primarily with regard to the technical merits of IAEA safeguards as I knew them at the time of my service in Vienna from 1977 through 1980.

It is my opinion, and it is my testimony this morning that the fundamental objective of IAEA safeguards to detect diversion of sensitive nuclear materials cannot presently be met and will not be met in the foreseeable future. There is clear evidence of the fact that safeguards are not being met in the IAEA safeguards implementation reports which have been mentioned this morning, which have been published for the years 1976 through 1980. These reports identify numerous gaps in the safeguards system, but inexplicably conclude that there has been no diversion of nuclear materials. It further appears to me that most U.S. officials are not aware of the degree of inadequacy of IAEA safeguards.

There are four principal reasons why IAEA safeguards are ineffective. Namely, the IAEA has basic structural limitations: two, the IAEA has inadequate resources: three, there is insufficient cooperation with the IAEA on the part of facility operators in member states; and four, there are shortcomings in the actual implementation of safeguards by the IAEA.

The structural limitations concern the relatively immutable aspects of IAEA safeguards.

First: IAEA safeguards are aimed at the control of certain weapons-usable materials, namely high-enriched uranium, U-233, and plutonium; and certain indirect use materials, namely, low enriched, normal and depleted uranium and thorium which can be converted to weapons-usable materials. IAEA safeguards do not apply to uranium and thorium ores and a number of other materials which could be used to produce weapons-usable materials. The DOE and NRC control materials that are not under IAEA safeguards.

Second: Under the NPT, the IAEA does not safeguard facilities, but only nuclear material at certain strategic points within a facility identified by design information submitted by a State and agreed to by the State as necessary points to apply safeguards. This is the subject of give and take. Accordingly, the IAEA does not have free access within a facility and does not seek to discover hidden or undeclared nuclear material or equipment or to discover undeclared installations. As mentioned previously, it has no intelligence capability. It thus has severely limited powers.

Third: IAEA does not have the freedom to designate which and how many inspectors it wants to send to inspect a facility. A State can impede the application of safeguards by limiting the acceptance of inspectors. In the case of a small State, as few as four inspectors may be designated for the State, not all of whom may visit the State in a given year. And inspectors have—there are variations in the personalities of inspectors. They do not all take the same attitudes with respect to things. The State can delay the acceptance of a new inspector by failing to act on the IAEA proposal for designation, or simply refuse to accept the designation of an inspector.

A fourth structural limitation lies in the limited effectiveness of simple accountancy as the safeguards measure of fundamental importance. This is true for two reasons. One is that measurements are not perfect and therefore the oeprator may report an apparent loss or the IAEA may discover one through verification that appears to be a possible diversion but which, in fact, is the result of inaccuracies of measurement: In fact, the accumulation of inaccuracies of measurement may be so great, particularly where large amounts of material are processed, that it is impossible to detect the diversion for military purposes of a significant quantity of nuclear material. That is, sometimes this detection area is a very grey area.

The second reason is that mistakes and accidental losses do occur. These also cannot be distinguished from possible diversions. Further, when an indication of a possible diversion occurs, the IAEA must assume that it could be an indication that diversion is occurring at many different locations within an inspected country. Since such diversions occur frequently, and since the IAEA cannot fully investigate every one by reinventorying the entire country, the IAEA is, in fact, not capable of detecting diversions nearly as effectively as many believe it can.

Another structural problem concerns enforcement action. In the case of a diversion which is not corrected in a reasonable period of time, the IAEA is permitted to take the matter before the U.N. Security Council and the General Assembly. In the case of a simple failure of a country to cooperate with IAEA safeguards, of which there are many, in my opinion, there is virtually nothing that the IAEA can do to achieve corrective action.

Many States do not have their own systems of accounting and control which meet IAEA guidelines. Little is done on that count.

Other limitations of a quasi-structural nature is the situation that IAEA has presently gotten itself into with regard to what it has agreed to in the way of facility arrangements. This has created precedents, and these agreements permit such effectiveness-limiting practices as inspection by observation only, the joint team approach, no less favorable treatment, and memoranda of understanding that further reduce the published agreements that seriously reduce the scope of inspections.

Finally, one can consider the dual promotional and regulatory roles of the IAEA to be a structural limitation. A similar situation resulted in the splitting of the U.S. Atomic Energy Commission into two separate agencies. In fact, one stated role of IAEA safeguards is the facilitation of nuclear commerce, possibly the principal one.

The second basic reason that IAEA safeguards are ineffective has to do with resources. It is not possible for the IAEA to carry out as many thorough inspections as are considered necessary due to insufficient inspector manpower, funds, support staff, and equipment.

I feel that the IAEA would benefit by the addition of research staff and the expansion of the existing staff in the area of review of inspection data.

The third reason safeguards are inadequate is because of insufficient cooperation from inspected States and facility operators. I think this is a principal reason. Many examples of lack of cooperation can be cited. Their end effect is to reduce the effectiveness of safeguards. There have been many cases where the views of the IAEA and of inspected States have been in conflict. Such issues have included access to records and facilities, charges for services, the taking and shipment of samples, and the scheduling of activities. Many times States have refused inspectors' efforts to verify design information, in spite of the fact that the IAEA has reached agreement on subsidiary arrangements and arrangements for safeguarding those facilities with States which require a complete design information review.

The fourth reason why Agency safeguards are ineffective simply is——

The CHAIRMAN. Mr. Morgan, I would appreciate your summarizing your statement because we are going to run out of time and will not have time for questions for you.

Your entire text, of course, will be printed in the record.

Mr. MORGAN. Thank you, sir. I think I can skip the last part. Basically it has to do with the actual implementation in which unavoidably there have to be shortcomings, and problems do occur from time to time.

Finally, I would observe that the IAEA is constantly concerned for the confidentiality of commercial information that frequently is not warranted in my opinion. States and operators have frequently used this justification for limiting the scope of inspection activities. This false confidentiality has also tended to cloak the IAEA's shortcomings.

I believe that greater transparency should be sought if the IAEA is to convince us of its safeguards adequacy.

In summary, and in due respect for the many very fine individuals who are employed by the IAEA, it is my considered opinion that IAEA safeguards against the diversion of sensitive nuclear materials are not presently effective and will not be effective in the foreseeable future. Perhaps the problem is simply bigger than IAEA's ability to handle it.

Thank you, sir.

[Mr. Morgan's prepared statement follows:]

PREPARED STATEMENT OF EMANUEL R. MORGAN

Thank you, Chairman Percy, for the opportunity to testify before this Committee regarding the ability of the IAEA to effectively safeguard nuclear material. A sober evaluation of the actual effectiveness of IAEA safeguards bears heavily upon vital non-proliferation and international security issues.

Before proceeding, I'd like to give you a brief idea of the background that I bring to this hearing. This includes a bachelor's degree in chemistry and graduate studies in business administration and statistics.

I have worked for 15 years in the area of safeguarding nuclear materials. From April 1967 until July 1968, I was employed as a chemist with NUMEC, Atlantic Richfield Chemical Company. From August 1968 until October 1975, I worked as a safeguard inspector with the Atomic Energy Commission and its successor, the Nuclear Regulatory Commission. From October 1975 to April 1977, I worked with the Nuclear Regulatory Commission in materials and plant protection standards. From May 1977 until August 1980, I was employed as a safeguards inspector with the International Atomic Energy Agency in the Euratom and Far East sections. From September 1980 until July 1981, I was employed by the Nuclear Regulatory Commission Office of Standards Development and Nuclear Regulatory Research, Safeguards Branch, as a statistician and material control analyst. I left the Nuclear Regulatory Commission last July and am now in private business.

Throughout this 15-year period in the field of nuclear materials safeguards, I was neither an advocate nor an opponent of nuclear energy. I am testifying as a private citizen, primarily with regard to the technical merits of IAEA safeguards as I know them at the time of my service in Vienna from 1977 through 1980.

Prior to my leaving the NRC last July, I wrote a report on IAEA safeguards at the request of Commissioner Victor Gilinsky. This report has unfortunately and inexplicably been released to the news media and has been the subject of media comments, some uncharitable, by unidentified officials. I personally have refused to respond to these comments and do not condone the release of an official classified report written for internal U.S. Government use.

It is my opinion and it is my testimony this morning that the fundamental objective of IAEA safeguards, to detect diversion of sensitive nuclear materials, cannot presently be met and will not be met in the forseeable future. There is clear evidence of the fact that safeguards are not being met in the IAEA's Safeguards Implementation Reports, published annually for the years 1976 to 1980. These reports identify numerous gaps in the safeguards system, but inexplicably conclude that there has been no diversion of sensitive nuclear materials. It appears to me that most U.S. officials are not aware of the degree of inadequacy of IAEA safeguards.

There are four principal reasons why agency safeguards are ineffective, namely:

1. The IAEA has basic structural limitations;
2. The IAEA has inadequate resources;
3. There is insufficient cooperation with the IAEA on the part of facility operators and member states;
4. There are shortcomings in the implementation of safeguards by the IAEA.

STRUCTURAL LIMITATIONS

The structural limitations concern the relatively immutable aspects of IAEA safeguards.

First, IAEA safeguards are aimed at the control of certain weapons usable materials, namely high enriched uranium and plutonium; and certain indirect-use materials, namely low-enriched, normal and depleted uranium and thorium, which can be converted to weapons usable materials. IAEA safeguards do not apply to uranium and thorium ores, and a number of other materials, which could be used to produce weapons usable materials.

Second, under the NPT, the IAEA does not safeguard facilities, but only nuclear material at certain strategic points within a facility identified by design information submitted by a State, and agreed to by the State, as necessary points to apply safeguards. Accordingly, the IAEA does not have free access within a facility and does not seek to discover hidden or undeclared nuclear material or equipment or to discover undeclared installations. It thus has severely limited powers.

Third, IAEA does not have the freedom to designate which and how many inspectors it wants to send to inspect a facility. A state can impede the application of safeguards by limiting the acceptance of inspectors. In the case of a small state, as few as four inspectors may be designated for the state, not all of whom may visit the state in a given year. The state can delay the acceptance of a new inspector by failing to act on the IAEA proposal for designation or refuse to accept it.

A fourth structural limitation lies in the limited effectiveness of simple accountancy as a safeguards measure of fundamental importance.

This is true for two reasons. One is that measurements are not perfect, and therefore the operator may report an apparent loss or the IAEA may discover one through verification that appears to be a possible diversion, but which in fact is the result of inaccuracies of measurement. In fact, the accumulation of inaccuracies of measurement may be so great, particularly where large amounts of material are processed, that it is impossible to detect the diversion for military purposes of a significant quantity of nuclear material.

The second reason is that mistakes and accidental losses do occur. These cannot be distinguished from possible diversions. Further, when an indication of a possible diversion occurs, the IAEA must assume that it could be an indication that diversion is occurring at many different locations within an inspected country. Since such indications occur frequently, and since the IAEA cannot fully investigate every one by reinventorying the entire country, the IAEA is in fact not capable of detecting diversions nearly as effectively as many believe it can.

Another structural problem concerns enforcement action. In the case of a diversion which is not corrected in a reasonable period of time, the IAEA is permitted to take the matter before the U.N. Security Council and General Assembly. In the case of a simple failure of a country to cooperate with IAEA safeguards, there is virtually nothing that the IAEA can do to achieve corrective action.

Many states do not have their own systems of accounting and control which meet IAEA guidelines. But little can be done by the IAEA to achieve compliance.

Other limitations of a quasi-structural nature are the various concessions that the IAEA has made to certain states which serve as precedents and which constrain the effectiveness of subsequent agency agreements with other countries. These agreements permit such effectiveness-limiting practices as inspection by observation only, the joint team approach, no "less favorable treatment," and memoranda of understanding that seriously reduce the scope of inspections.

Finally, one can consider the dual promotional and regulatory roles of the IAEA to be a structural limitation. A similar situation resulted in the splitting of the U.S. Atomic Energy Commission into two separate agencies. In fact, one stated role of IAEA safeguards is the facilitation of nuclear commerce.

RESOURCES

The second basic reason that IAEA safeguards are ineffective has to do with resources. It is not possible for the IAEA to carry out as many thorough inspections as are considered necessary, due to insufficient inspector manpower, funds, support staff and equipment.

With regard to staff, it is recognized that the United States and other countries provide experts to the IAEA. But these experts are not permitted access to inspection data.

The IAEA would benefit by the addition of research staff and expansion of the staff supporting analysis of inspection data. The scope of the internal audits also should be expanded to permit reviews of the adequacy of inspections.

COOPERATION

The third reason safeguards are inadequate is because of insufficient cooperation from inspected states and facility operators. Many examples of lack of cooperation can be cited. Their end effect is to reduce the effectiveness of safeguards. There have been many cases where the views of the IAEA and of inspected states have been in conflict. Such issues have included access to records and facilities, charges for services, the taking and shipment of samples, and the scheduling of activities. Many times states have refused inspectors' efforts to verify design information. This is despite the fact that the IAEA has reached agreement on subsidiary arrangements with states which require a complete design information review.

In the case of the U.S. mission to the IAEA, it was my experience that the mission did little to improve cooperation on the part of states with the IAEA. For example, one U.S. inspector waited nearly a year for his designation to be accepted by a country that happened to be friendly to the United States. Inspectors noted that the U.S. mission was helpful in the area of financial assistance to the IAEA, but not in support of the inspection staff per se.

In response to criticism by U.S. inspectors, the U.S. Mission commissioned an audit of the Division of Safeguards. The U.S. Mission should be complemented for this action.

SHORTCOMINGS IN SAFEGUARDS IMPLEMENTATION

The fourth reason why agency safeguards are ineffective simply is that there are shortcomings in the implementation of the safeguards. Arrangements for the application of safeguards at the facility level are not adequate. The IAEA has been too flexible in negotiating the actual time permitted for inspectors to conduct inspections. The amount of time countries allow for inspections may be much lower than the maximum suggested by published IAEA guidelines. There may be no provision for necessary activities, such as detailed chemical analysis of such samples as suspect finished fuel rods and fuel elements despite the fact that such analysis may be the only way to determine whether the stated quantity of nuclear material is present. The manager of the facility being inspected may simply refuse to ship samples to the IAEA laboratory.

There may be no requirement in the negotiated safeguards agreement for a complete list, containing necessary data, of items in inventory which must be available for the IAEA inspector to verify a physical inventory.

In the area of containment and surveillance, devices such as seals and cameras are employed to detect some diversion scenarios. For example, cameras in a power reactor snap pictures of a fuel pond at intervals intended to protect against a possible diversion of a heavy cask containing fuel. But there may be no protection against less likely scenarios, such as shuttle system not visible from camera's vantage point in the fuel pond. Also cameras and seals are far from foolproof. The longer that a particular device is in use, the more likely it is that an operator attempting to divert material would be able to develop counter-measures to defeat it. Yet the IAEA is using seals that were in use 10 years ago. And some countries reserve the right to approve or reject new monitoring devices.

In safeguarding against the breeding of plutonium or uranium-233 in an undeclared blanket or in the structural components of the core of a reactor, the IAEA does little. The IAEA does not monitor reactor operating parameters and does not have, in cases of which I am aware, access to the control room.

Also, the IAEA does not verify the electrical output of reactors. This information would be valuable to confirm the quantities of plutonium produced. Burnup calculations are not verified and isotopic correlation techniques are not applied, except in the case of a few development studies unrelated to safeguards inspections.

The IAEA has found it virtually impossible to do transit accounting, that is, to check whether facility B received the material that facility A said it sent there. As a result, verification of records and reports is done primarily by checking the internal consistency of an individual facility's statement, without corroborating that statement with statements of other facilities that shipped to or received from the facility under review.

Additionally, the IAEA has usually not been able to calculate the uncertainty of material unaccounted for, pursuant to the IAEA's statutory mandate. This calculation would be useful because it would give the IAEA an idea of permissible limits for material unaccounted for, pursuant to the IAEA's statutory mandate. This calculation would be useful because it would give the IAEA an idea of permissible limits for material unaccounted for. This calculation is not presently performed.

Other inadequately covered routes of possible diversion include waste streams and retained waste.

At the present time, there is no agreement within the IAEA with regard to a list of possible ways of diverting nuclear materials the agency must attempt to detect. As a result, this question is left to the individual inspector's answer. Often, the country and operator are given the benefit of the doubt.

Although the IAEA is primarily concerned with accounting, for the three years that I was employed there, the agency did not have a single professional accountant on the staff of the Division of Safeguards.

There is no formal language training for inspectors, although individual inspectors have provided private assistance to one another. The IAEA does have an evening language program for employees and their spouses, but this is limited to German and four of the five UN working languages, on a one evening per week basis. That did not help me with Japanese, for example. As a result, inspectors' communication with operators is difficult at best.

Finally, I would observe that the IAEA is constantly concerned for the confidentiality of commercial information that frequently is not warranted. States and operators have frequently used this justification for limiting the scope of inspection activities. This false "confidentiality" has also tended to cloak the IAEA's shortcomings. I believe greater transparency should be sought if the IAEA is to convince doubters of its value as a safeguards agency.

SUMMARY

In summary, and in due respect for the many very fine individuals who are employed by the IAEA, it is my considered opinion that IAEA safeguards, against the diversion of sensitive nuclear materials, are not presently effective and will not be effective in the foreseeable future. Perhaps the problem is simply bigger than IAEA's ability to deal with it.

The CHAIRMAN. Thank you very much, Mr. Morgan.

I will ask just a few questions.

Senator Cranston, would you be able to continue this hearing? I have a policy luncheon that I have to get to, and I hope I get there before the luncheon is over.

Senator CRANSTON. Certainly, but I would hate to have you absent from any policymaking meeting of the Republican Party.

The CHAIRMAN. Thank you. I am not sure I want that on the record. [General laughter.]

Since all of you are now nongovernmental witnesses, could you state any affiliations that you have in your profession or business with the new U.S. nuclear power industry, IAEA, foreign nuclear power entities, or any other organizations that should be on the record as possibly having any influence at all, or to whom you might have any accountability?

You can certainly do that for the written record if you would like to.

Mr. LEVENTHAL. I can state on the record now that I have none?

Mr. SHEA. I have a small contract which deals with the potential safeguards implications in extended spent fuel storage in U.S. utilities with the Electric Power Research Institute of Palo Alto. That would be the only thing.

Mr. MORGAN. I have none personally, sir.

The CHAIRMAN. Thank you.

Mr. Leventhal, again your statement is a powerful statement, just as your service here in the Senate on the Senate staff has always been very provocative, and we appreciate that forthrightness.

Could you tell us about the Nuclear Club? I notice you have a full-page ad in the New York Times. How is it financed now? Is it individual membership essentially? Are there any large contributors, and how many members do you have now?

Mr. LEVENTHAL. I wish there were more large contributors. We have some. We also have about 300 members at this point, and we are about to solicit more, probably through a direct mail effort. Membership is $25 a year to become a member of The Nuclear Club—that is, the "alternative" Nuclear Club.

We have a grant and matching arrangement with an anonymous donor that will sustain us until we get a substantial response on a direct membership basis.

The CHAIRMAN. You say that the United States should take the lead through unilateral action to curtail nuclear proliferation.

What do you suppose would be the response of other nuclear exporting states, and, is a revived nuclear suppliers' club feasible?

Mr. LEVENTHAL. Well, as we saw in the Carter administration, we probably can anticipate a hostile response. That should not deter us, however, because of the larger global interests at stake. We have to bear in mind that the policies of the principal nuclear supplier nations are often driven by the industry, which needs to be supported to survive. Domestic plant orders are down. Export orders are down.

The industry's big hope is to get into a plutonium economy to evolve to the next generation of reactor. My sense of it is that industry suffers from a blind spot. The nuclear industry frankly does not acknowledge the inherent unmanageability of plutonium on a commercial basis. The IAEA itself is affected by the promotional biases, as Mr. Morgan just pointed out. The safeguards function is carried out in a somewhat methodical fashion so as not to unduly agitate sensitivities.

There are some instances where even the most basic functions are not being carried out effectively. I might give one example, one that perhaps the oversight function of this committee might address itself to. I have heard from a former inspector—I might hasten to add, neither one at this table—that recently some IAEA inspectors, because they were so dissatisfied with the way that seals were being checked back at headquarters, decided to do a test. They deliberately tampered with some seals. The seal is the so-called basic IRS seal. There is solder in the middle, and the solder is scratched with a random pattern and photographed before the seal is applied.

After an inspection, the inspectors, bring back the seals that had been in place at a nuclear plant. They do not check the seals at the plant. They bring them back and there is an IAEA official—at the time that this was happening it was a Pakistani—who checks the seals to determine whether they had been tampered with. Several inspectors felt he was not doing an adequate job of checking the seals, so they took some seals that had not been applied—they basically took them out of their desk drawers—and gave them to him along with others that actually had been taken from plants. Not a single tampered seal had been discovered as such.

This was brought to the attention of the Director of Safeguards of the Agency, as well as to the U.S. mission, and my understanding is that still nothing has been done to try to improve the quality control of the checking of seals.

So here you have the most rudimentary form of containment, the applying of seals, which some critics feel can be tampered with or be counterfeited without detection. In this case, tampered seals were not detected.

This should be a cause of grave concern.

The CHAIRMAN. Thank you.

We have mentioned Pakistan a number of times this morning.

Could you very concisely sum up your feelings as to what the U.S. Government position ought to be with respect to Pakistan now, and its alleged nuclear weapons program? What do you think we ought to do?

Mr. LEVENTHAL. Under the Symington amendment, and the Glenn variation of it, the policy had been that there should be no weapons-building program. The way the policy has since evolved, it appears that we will not seek to bar them from developing a weapons program, but we will seek to bar them from testing a weapon. That seems to be the compromise. Only if a weapon is tested, will there be an immediate cutoff.

I believe that is an unsatisfactory compromise. We have to draw the line with Pakistan because of the significance of the Pakistani program, not simply in terms of its own national desire to have the bomb, but because of the implications of the so-called Islamic bomb. For the United States to be perceived, as it is being perceived, as backing off from legislation that was written specifically to seek to prevent Pakistan from developing a weapon, whether or not they test it, and from engaging in activities suspected of involving diversion of plutonium from their powerplant—in light of all this, I think it is essential that the United States stick to its initial policy and withhold assistance until it is satisfied that safeguards are being effectively applied in Pakistan and that we are satisfied that there is no weapons program ongoing. There is much evidence to the contrary. Perhaps the inspector to my left might be able to elaborate on that based on his own knowledge.

The CHAIRMAN. Mr. Morgan, I wonder if you could tell the committee in your experience whether you encountered pressure from the Agency Secretariat to change your inspection reports?

Mr. MORGAN. No, sir, I did not.

The CHAIRMAN. You did not.

Mr. MORGAN. That is correct.

The CHAIRMAN. You have been severely critical of IAEA safeguards.

What is the alternative, or is it just a matter of internally improving the safeguards through the international agency?

Mr. MORGAN. I think the interest that the world community has in the IAEA is to provide assurance that there is no diversion of nuclear materials. It is not simply a U.S. security concern. I assume that the United States, it would appear to me, has other means at its disposal of determining whether or not countries are diverting, however effective they may be, but it is a question of assuring country A that country B is not diverting nuclear material or is not producing weapons through some means.

Therefore, I think one of the basic problems is that the IAEA is currently not effective, and there are very serious basic problems with the possibility of its effectiveness. It is possible that some sort of international study group could be convened to discuss this matter and to seek alternatives. That is, how can states be assured that their neighbors are not producing nuclear weapons? I think that is the question.

I feel there is a role for the IAEA. I do not feel that the IAEA is totally useless. I just think it is not enough and I think that we have to recognize that we are not talking about minor insufficiencies, but insufficiencies that will not be addressed at our current pace. It is not simply a question of money; it is also a question of the willingness of states to engage in this sort of agreement with respect to safeguards.

Thank you, sir. I hope I answered your question.

The CHAIRMAN. Would you just tell us whether or not qualified interpreters were available to you, and if you did have interpreters when you were out in the field, who provided the interpreters?

Mr. MORGAN. My experience is basically limited to Japan, the Federal Republic of Germany, and France. In the case of Japan, a member of the state system of safeguards, who also acted as an interpreter, accompanied an IAEA inspector. In some cases this was effective, but I must mention that the state system of inspection, which the IAEA takes into account in its determination of effectiveness, and conducts its inspections in the language of the country. That is, the Japanese, for example, conduct their inspection in Japanese, and as an international inspector, you are required to observe this. I personally did not feel that that was very effective considering that I personally had no training in the Japanese language.

In the case of Germany, I do speak a good bit of German and I had no problem personally. I did find myself translating for other inspectors, members of the Euratom inspectorate, for example. Also in the case of France, I speak French and personally had no problem.

The CHAIRMAN. Thank you very much, Mr. Morgan.

Dr. Shea, of the inspectors in IAEA whom you know personally and have known personally, how many would you say were technically qualified to carry out their inspections?

Mr. SHEA. As a rough percentage?

The CHAIRMAN. Percentages, yes.

Mr. SHEA. I would say that the spectrum runs from people which are Ph. D.'s and highly motivated to people that have had no experience in safeguards that come in with the designation of a country with no preemployment interview and essentially occupy a space. Where you would rank the staff in some sort of a spectrum over that, I would think that you would have something of a bell distribution with most of them that are quite acceptable and some on both extremes in that case as being incompetent to very competent.

The CHAIRMAN. Taking into account that every inpector does take an oath not to take directions from foreign states, what kind of relationship do you think should exist between the inspector and the missions of his other home country?

Mr. SHEA. I would expect that there would be an exchange of information to the point that it would not violate the terms of that oath, that in the case that an individual staff member felt that it would be useful to clarify information, that the mission is a source at hand.

We all signed the oath, as you indicate, not to seek advice, and the missions of course are under equal restraints from offering advice to the members of the staff. So it is a very sensitive area.

The CHAIRMAN. What kind of technical support do you think the agency most needs, and does the United States really provide this kind of assistance?

Mr. SHEA. There are assistance programs underway now from the United States and from Canada, the Federal Republic of Germany, Japan, the United Kingdom, the Soviet Union, and to a lesser extent, from Australia. In the case of Canada, the efforts are directed to resolving the safeguards issues associated with the CANDU reactors. In the case of Japan and the Federal Republic of Germany, they have principally been directed toward solving the safeguards problems in their facilities, making things more effective, less intrusive, that type of an approach.

The programs of the Soviet Union, Australia, and the United Kingdom are less well directed, and are rather minor by comparison.

The U.S. effort has been very broad in the sense that it has addressed support for policy studies, a very extensive program of technology development—including projects to produce new seals that would be verifiable in the field, which would be one way of solving this particular problem that Mr. Leventhal noted—to providing training, to providing additional staff in the form of cost-free experts that are not subject to the regular staff selection process, but also unfortunately do not have access to safeguards confidential information as a matter of rule. Only in certain selected instances is that not the case.

Senator, many, many efforts have been made, and many are underway. If I might be permitted, I would like to offer further suggestions for improvement at a later time.

The CHAIRMAN. Thank you very much, Dr. Shea.

Mr. SHEA. I might offer one additional opinion, if I might, in that regard. I think that there are additional things that the U.S. might usefully undertake, for example, in the sense of demonstrations conducted in U.S. facilities that would not interfere with the application of safeguards in any way. In one particular case, the Allied General reprocessing facility in South Carolina, for example, could be used very effectively as a test and demonstration base, even without processing plutonium. In an international program I think that might be especially useful.

The CHAIRMAN. Thank you.

Senator Cranston, the GAO witnesses are still in the room. I regret very much that if I am to have any impact in this meeting at noon, I am going to have to leave momentarily. If you would like to have the GAO summarize their testimony, you certainly can, or, because the testimony has been available for all of our study and the backup, both classified and unclassified studies, on which it was based have been available to us, it can just be inserted in the record.[1]

GAO has made an important study of the Nuclear Non-Proliferation Act dated May 1981, and that report is available to the public. It contains important information on safeguards. I know all of the people in this room would benefit from it because of their own interest in it, too.

In conclusion, I simply would like to state that this hearing has been a very valuable airing for me of the functions and strengths and weaknesses of IAEA. As long as I have worked with it through the years, I have added to my knowledge today considerably. I think we have added to our knowledge of the entire nuclear nonproliferation policy.

As Mr. Leventhal said in his statement, I think it is correct that this is the first time that a congressional hearing has ever been held on the important and particular subject of the safeguards of the International Atomic Energy Agency, and even though the NRC Commissioners may have said the same things in other ways, the emphasis that they have placed on this issue by their letter to us signed by all the Commissioners is, I think, extremely important.

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[1] See page 30.

This certainly is not going to be the final hearing by any means on this particular crucial issue. We will have as many as required. We certainly have total bipartisan support in that regard, I know, from Senator Cranston and members of the minority who are deeply interested in this issue, as Senator Pressler is as the chairman of the Arms Control Subcommittee of this committee.

So we will take whatever action the committee deems appropriate to followup in this area. It is the most important single thing in the long run that we can do. We hope it is in the long run. Maybe it is in the short run. We have to find better answers to these problems than we now have.

Several things do seem clear from these hearings. I would conclude, first, that the United States must take an aggressive lead in the IAEA to upgrade and reform the system. We have a leadership responsibility that we should exercise. I will do everything I can to see that we do take that aggressive lead.

Second: We obviously must push immediately for a far greater release of IAEA information and reports. I cannot see that secrecy serves any purpose whatsoever. Maybe originally it did, but it now is defeating the program. The cloak of secrecy should be taken off in this area. The more we expose it to the light of day and the sunshine, the better.

Third: The administration in my judgment needs to concentrate much more intensively on the whole nuclear nonproliferation issue and make public a more detailed policy than it now has. The administration is perceived to have a policy that results in piecemeal decisions, and that is much too vague in its expression. I hope that the administration will concentrate more intensively and be more precise as to what its views are.

I think Secretary Kennedy focused hard on it and came down hard in response to a provocative editorial that we had this morning in the Post.

Fourth: I would call upon the administration to provide as appropriate to the Congress or its staff a regular informal report on what actions are underway in the improvement of the safeguards regime.

And finally: I still believe that the IAEA safeguards system is salvageable. I do not see any ready alternative to it. It is easier to build and improve and strengthen the system that is in being than to start all over from scratch with something else. But it is apparent to me that it needs intensive work and intensive improvement.

If this proves impossible in the near future, then I think we are going to have to consider alternatives. I would hope that everyone involved with this problem would give thought to what alternatives we have? What are they? What are the options that we ought to be looking at? We ought to have a double track working here now, improvement in the present safeguards system, making it really effective, and second, if we cannot make it effective, what other course of action do we have?

Senator Cranston, I thank you very much for continuing and carrying on for me, and I especially thank you for your leadership in this field. We appreciate the time and thought given to this testimony by all of our witnesses.

Senator CRANSTON. Mr. Chairman, before you leave, I would like to thank you for your leadership and cooperation and the thought you have given to this very great problem. I am glad that we will have more hearings. I think we should look into the matter of whether we should explore what more needs to be done beyond what IAEA can now do or could do in the future even if it had more perfect powers and was more perfectly administered. It is my impression that even if that were the case, that would only slow down nuclear proliferation; it would not stop it. We need to think anew about the whole problem beyond the present safeguards system, what would give us some hope of actually stopping nuclear proliferation? I think we have to focus on that. I suggest that we explore how we might delve into that and what witnesses might be of help to us on that score.

The CHAIRMAN. I think we will direct our staff to work along those lines. I appreciate very much your suggestions.

Senator CRANSTON. Thank you very much.

Mr. LEVENTHAL. Mr. Chairman, might I ask one thing? In the interest of lifting the secrecy a bit on safeguards, I wonder whether this committee might consider putting into the record the Morgan report as it was published in Nuclear Fuel. Nuclear Fuel is a trade journal, rather expensive for the public to get access to. It might serve the public interest to put the Morgan report into the record of the hearing.

The CHAIRMAN. Without objection we will insert that into the record.

[The information referred to follows:]

[From Nuclear Fuel, November 23, 1981]

REPORT ON THE IMPLEMENTATION OF IAEA SAFEGUARDS

The following is a report to NRC Commissioner Victor Gilinsky by former IAEA inspector Emanuel Morgan.

INTRODUCTION

The purpose of this report is to provide an inspector's insight into IAEA safeguards, based upon seven years as a domestic safeguards inspector with the U.S. Atomic Energy Commission's Division of Nuclear Materials Safeguards and the successors of that organization in the AEC and NRC, three years as an international safeguards inspector with the IAEA, and, in addition, several years as an NRC headquarters staff member.

The concept has been advanced at high levels that a country's signature of the NPT [Nuclear Nonproliferation Treaty] is the principle [sic] aim of IAEA safeguards. This report is only concerned with the technical aspects of IAEA safeguards inspection activities, and does not address such broad issues.

The concept has also been advanced that IAEA safeguards are of more value than is apparent by virtue of their technical value per se. This may be true where a state does not understand the means by which safeguards are applied. In my experience, the representatives of the state systems and the operators of the installations know exactly how effective international safeguards are and how the international safeguards system can be defeated. I can only address the technical capability to safeguards nuclear materials.

ORGANIZATION OF IAEA

The Board of Governors of the IAEA, on which 34 states are represented, is the principal authority which influences the policy of the agency. Voting is on a one-member one-vote basis, so that less populous countries have as much influence as more populous ones. In terms of budget, however, a large proportion of funding is provided by the U.S., and the U.S. also provides additional monies and technical assistance to the agency.

The agency's Inspectorate is very responsive to concerns of the countries which it inspects. A complaint via the Board of Governors can end or alter the career of an agency employee. Thus, the Inspectorate is controlled by the inspected. A "diplomacy above all else" or "don't push your luck" mentality prevails.

Another point of interest about the IAEA organization in the Department of Safeguards is that nationals of the country inspected have access to inspection reports, seals, seal records, etc., that concern their own countries. For example, I once had to explain a report that I had written to an individual responsible for clearing it from the country that the report concerned. Although the IAEA takes modest steps to avoid this, it is unavoidable under the present controls.

Finally, it should be noted that the IAEA does not teach languages to inspectors and does not assist inspectors to learn the language of the country which he inspects. The IAEA operates in four official languages of the United Nations and on a semiofficial basis in German. Often the inspector cannot communicate with the party being inspected, except via a representative of the national authority or Euratom, who is conducting a parallel inspection. This occurs more often than not, I would estimate. A result of language difficulties is poor communications. For example, failure of an operator to carry out a commitment made to an inspector may be blamed on not having understood.

MISSIONS OF THE AGENCY

Member countries of the agency provide liaison to the agency by way of their missions to the agency. Some countries have a special staff for this purpose, such as the U.S. One of the comments one hears in Vienna is that "You can't get anything done around here without going to your Mission." As an example of this, I witnessed a case where a non-U.S. inspector was promoted to P-5 (ca. $55,000 p.a. tax free) while I was on inspection travel with him. He received two telegrams of congratulation concurrently. One of these came from his section head at the agency; the other came from his Mission. In my experience, I discerned inadequacy in the safeguards area. Most U.S. inspectors did not feel supported by the U.S. Mission.

SUBSIDIARY ARRANGEMENTS

A country that has signed the NPT in time concludes an agreement with the IAEA modeled after INF/CIRC 153. This agreement specifies in greater detail than that found in the NPT how safeguards are to be applied in the state. In addition to this agreement, subsidiary arrangements are concluded which specify how safeguards are to be applied. These subsidiary arrangements consist of a general part and of detailed attachments which specify how safeguards are to be applied to "facilities" and to "other locations" where nuclear material is present in small quantity.

Design information

The facility attachments are concluded on the basis of "design information" (DI) submitted by the state. In my experience, the headquarters review of the DI and its field verification has been inadequate.

The agency has the right to carry out DI verification, but often only three weeks notice may be required to be given before an installation receives nuclear material from the time the DI is submitted. Thus, a review of the DI may not be possible and may not be permitted. Such a review is important in many types of installations, to assure that there are no undeclared diversion routes, connections to sampling stations, bypass lines, etc. For example, once a reprocessing plant becomes radiologically contaminated, there is no further chance for a DI review. I am not aware of any DI review of any reprocessing plant.

Also, many tank calibrations in a reprocessing plant can be performed only before an area becomes contaminated. Although verification and witnessing of tank calibration is not a design information review activity per se, it can only be performed before nuclear material is introduced. Due to the short time interval between the submittal of the design information and the introduction of nuclear material, as well as because the plant operator simply does not permit the witnessing of calibrations, the verification activity is only rarely carried out by the IAEA. This lack of assurance of tank calibration introduces an additional uncertainty in the quantities of nuclear material, transferred and in inventory.

In the case of facilities involving sensitive information, such as reprocessing plants and enrichment plants, DI review is typically not permitted, although newsmen may be given tours. This shows the seriousness with which the IAEA is regarded in the real world.

Another shortcoming in the design information is its completeness. For example, in comparing the information on piping and tanks available at one [pilot] reprocessing plant, WAK [at Karlsrahe], with that provided for another, the PNC [Japan's Power Reactor & Nuclear Fuel Development Corp's Tokai] reprocessing plant, one finds that the PNC information is orders of magnitude more detailed than in the WAK case. In comparison, the WAK data is scant and probably inadequate. This is because the diversion paths and falsification scenarios possible in a reprocessing plant can only be addressed with complete knowledge in hand regarding by-pass and recycle routes, and storage locations.

In spite of, or without regard to, the adequacy, completeness, or examination of the design information, negotiations are conducted to conclude a facility attachment, to specify how an installation will be safeguarded. The country may, however, fail to agree with the agency on the facility attachment. Years may pass.

Facility attachment

When the facility attachment (F/A) is concluded, it is a consensus document which may permanently emasculate efforts to safeguard the installation. For example, the "actual required inspection effort" (arie) agreed to may be barely enough to cover scheduled visits and may leave no time to resolve discrepancies or complete tasks that took longer than anticipated. And arie is taken very seriously. Quite often, arie is about 10 percent of "maximum required inspection effort" (MRIE), which is specified in the "Blue Book."

Another area, particularly in the case of bulk handling and reprocessing plants where the F/A falls short is not requiring that a "tag list" or "list of inventory items" showing the gross, tare, net, element, and fissile isotope weights be made available after the "physical inventory taking" (PIT) of the operator of the installation. This tag list would be used by the inspector in his physical inventory verification (PIV). Since a tag list is often not required, very often the inspector is left to take the inventory, rather than to verify it. This is an often impossible task for the inspector, due to his limited time and manpower.

When a tag list is required by the F/A, the specific bits of information required, such as element and isotopic weights, are not called for. Again, the inspector is defeated. The reason the inspector is defeated in such circumstances is that where the operator provides the tag list only after the inspector completes his verification activities, the operator is in the position to correctly report those items that he observed the inspector to have verified, but to falsify the reporting of those items that the inspector did not verify. Thus, the operator is in a position to falsify the material balance.

Typically, a stratified list of items on inventory is required prior to the PIT, for planning purposes. A record of actions taken during the physical inventory including a list of batch data is required. The list of batch data need not be available at the PIV, and further, is usually inadequate as a basis for verification, because individual items are usually not listed. Unfortunately, the distinction between PIT and PIV is often not comprehended.

Another shortcoming of the F/A is that it usually includes a clause such as, "inspection shall be by observation of the state authority's inspection only, unless observation is inadequate to permit the drawing of independent conclusions." This clause frequently leads to haggling and loss of precious time during the inspection as to what activities are actually permitted by the F/A, and often, to the failure of the inspector to carry out necessary activities.

The shortcomings mentioned above are not an exhaustive list, but should serve to illustrate that the inspector is often doomed from the start by an inadequately negotiated facility attachment.

Subsidiary arrangements—general part

This part of the subsidiary arrangements specifies how a state formally reports the inventory and transfer activity to the IAEA. There are various categories of "inventory changes" permitted. One of these is the "measured discard."

Usually there is a specified limit on the amount of measured discards which may be discarded by the operator; such a limit may be, for example, 0.01 kg effective per month per bulk handling or reprocessing installation, of material that is "disposed of in such a way that is not suitable for further nuclear use." When the amount exceeds the limit, the state is required to consult with the agency before discarding takes place. Since the quantities and physical form of nuclear material reported to have been disposed of are typically not verified because the discards occur at times when no inspector is present, a credible diversion path is constituted by measured discards. This situation is compounded in severity, it would seem, in a country such as FRG, where all waste is transferred to a central waste handing facility, which is not subject to IAEA safeguards. Once the waste goes to the central facility, pending resolution of the ultimate disposal of waste issue, it is "out ot sight, out of mind." Why IAEA is not permitted to inspect such a waste handling facility is unclear. At the time that the nuclear material is sent to such a facility, it often is suitable for further nuclear use.

Another category of waste removal is "retained waste." Retained waste is defined as "nuclear material which is generated from processing or an operational accident, which is deemed to be unrecoverable for the time being, but which is stored." Waste in this category, without regard to quantity, may be transferred out of inventory. Such waste no longer appears in the operator's book inventory records and is not reported to IAEA in the physical inventory list after the operator's physical inventory taking. Only by searching back to the time the transfer to retained waste occurred would a record be found. It is, therefore, "out of sight, out of mind." Considerable quantities of "retained waste" are stored at some bulk handling installation, but are not periodically verified by an IAEA inspector.

RECORDS AND REPORTS

Under this heading, I discuss the records of the installation and the reports that are submitted by the installation via the state (or regional authority such as Euratom) to the agency.

Records

The agency requires a system of records and reports in the facility attachment. The records are of two kinds, namely, (1) accounting records and (2) operating records.

I saw great differences between the quality of the accounting records from state to state and, within a state, from installation to installation.

I found, for example, that in FRG the records were not organized conveniently in the sense that in order for the inspector to perform a simple audit of the records, considerable time had to be wasted to summarize the activity that occurred since the previous visit. For example, in one major facility, the records were kept according to financial account. There were about 300 of these. There was no general ledger summarizing activity in the several hundred accounts, but there were numerous transactions within and between accounts. I found that to effectively carry out my audit, I had to create my own general ledger. During each inspection, I wasted several days in this activity. The facility simply saw no need to keep a general ledger, for its purposes. The point is that the operator or the state can cause the inspector to waste a lot of his limited time.

With regard to operating records, I also found deficiencies. For example, in one facility, there was no record kept of the final disposition of plutonium samples. Such samples were said to be returned to the process. But, one would expect a record kept showing date, time, and identify of the reintroduced samples. The agency simply does not concern itself with material control at that level of detail.

Reports

I noted that neither in FRG nor in Japan, nor elsewhere as far as I know, did a system of material transaction reports exist, such as does exist in the U.S. with the form NRC/DOE-741. This system is effective, in that serially numbered forms are issued by the shipper of nuclear material and are acknowledged by distribution of return copies by the receiver. These forms are matched by computer in the U.S. system to detect material missing in transit and to flag shipper-receiver differences. In the absence of such a system, an item missing in transit or shipped to an unauthorized recipient could go undetected.

The agency system, however, requires the reporting of transactions to the agency one month after the month in which they occurred. One way to detect material missing in transit or not shipped to the stated recipient, after the fact (but rather shipped to an unauthorized or undeclared recipient), is to compare each shipment declared as shipped in the monthly report with each shipment declared as received.

When I arrived at the agency in 1977, I found that this was being done in a summary form, well after the fact, by a clerk, in the case of Japan under the Far East Section. However, with the advent of magnetic tape reporting with NPT in January 1978, this comparison, known as "running the transit accounts," became the responsibility of the section for data processing operations, Division of Safeguards Information Treatment, in the Department of Safeguards. This section has responsibility for all NPT reporting. It was claimed that it was impossible to run the transit accounts because sufficient design information for all installations to permit preliminary error screening of reports had not been provided by the inspectors. Thus, the emphasis changed from accounting to that of the use of the computer as a device of interest in its own right.

At a late date, it was claimed that transit accounts could not be run because batch numbers provided by shippers were not always the same as batch numbers provided by receivers. Another problem, in the case of Euratom reporting, was that France did not report to the agency except for the one facility under safeguards, so that transactions between France and another Euratom country could not be checked. Thus, for a variety of reasons, I was repeatedly told that the transit accounts could not be run.

It was our belief, in Euratom section of IAEA, however, that transit accounts were run by Euratom, EEC, Luxembourg prior to the dispatch of the monthly reports to the agency. On one occasion, I was granted a special, nonroutine check of transit accounts, due to absence of supporting records. At that point, DIT was willing to entertain a special request. Several months elapsed in the course of running transit accounts for a single installation. I learned that there were shipments and receipts that did not match. We informed Euratom, Luxembourg, who replied that they had not detected this due to a computer malfunction. This episode lead [sic] me to believe that Luxembourg was not running transit accounts either.

Thus, the agency had, and presumably still does not have, any routine assurance that a stated shipment to an installation within a state or a group of states, such as Euratom, ever arrived. That is, with limited exception, when the agency checks the reports of installation X, it does not compare those reports with the reports of other installations which reported transactions with installation X. Thus, it only verifies the internal arithmetic consistency of installation X's reports, in effect, treated in isolation.

Another problem area for the agency has been in its Advance Notification of Internation Transfer reports. These are not always reconciled either. And, when they are reconciled, they often don't agree, due to inability to match shipper's and receiver's reports.

Finally, the DOE sends copies of Form NRC/DOE-741 for international transfers to the IAEA. These also are gracefully allowed to pile up "in the corner." It seems that the IAEA does not need them.

INSPECTIONS

Although I have discussed inspections in other sections of this report, I will provide some background here as to what an inspection consists of and what it can and cannot do for various types of facilities.

During my employment with the IAEA, the types of installations that I inspected included reproccesing plants, conversion and fuel fabrication facilities (bulk handling facilities), reactors and critical facilities of various types, and laboratories.

The approach that I will employ here is to explain first how IAEA safeguards generally, comment briefly on the generic safeguards techniques, and then explain how safeguards are applied at various types of facilities.

How NRC safeguards generally

INF/CIRC 153, The Structure and Content of Agreement Between The Agency and States Required in Connection With the Treaty on the Nonproliferation of Nuclear Weapons, popularly known as the "Blue Book," articles 28, 29, and 30, provides the following statement:

> 28. The Agreement should provide that the objective of safeguards is the timely detection of diversion of significant quantities of nuclear material from peaceful nuclear activities to the manufacture of nuclear weapons or of other nuclear explosive devices or for purposes unknown, and deterrence of such diversion by the risk of early detection.
>
> 29. To this end the Agreement should provide for the use of material accountancy as a safeguards measure of fundamental importance, with containment and surveillance as important complementary measures.
>
> 30. The Agreement should provide that the technical conclusion of the Agency's verification activities shall be a statement, in respect of each material balance area, of the amount of material unaccounted for over a specific period, giving the limits of accuracy of the amounts stated.

It is important to note that in the context of article 28, "diversion" should not be equipped with "removal." This is an important distinction, because typically, an agency inspector is concerned with diversion in the narrow sense as removal.

With regard to article 29, one sees that the basis of IAEA safeguards is: material accountancy, containment, [and] surveillance.

Material accountancy

In practice, "material accountancy" refers to the means by which the agency verifies the presence of nuclear material that should be present at an installation based upon records and reports. This system is, in itself, made difficult because the reports occur several months after the actual movement of nuclear material. Thus, the agency's material accountancy typically consists of verification of the arithmetic correctness of the operator's records verification of the authenticity of the records by means of shipping documents and the like furnished by the operator, and several months after the fact, cross-comparison of this information with reports of the same operator, which he sent via his national system to the agency on magnetic tape. As mentioned previously, the agency has thus far found it virtually impossible to inter-compare an operator's reports with reports of any other operator to verify the veracity of the reports, especially in the case of states under NPT.

Article 30 refers to the so-called MUF statistic, which is the operator's statement of the amount of nuclear material, based upon his physical inventory taking, that is apparently discrepant from the amount that is supposed to [be] present, based upon his records over a period of time. The LE (MUF) is typically not calculated, although the agency has good intentions of calculating an approximate LE (MUF) in the future.

Very rarely the agency calculates a D statistic, which is the inspector's MUF, based upon his verification of the operator's statement. This is typically incomplete, because the inspector rarely, if ever, measures all components of the operator's material balance closure and does not possess the information necessary to perform a realistic calculation. The agency just does not have the manpower to do much verification and often does not have time to take as many samples, even with a willing operator, as it believes necessary, of even the ending inventory component.

In the best of all possible worlds the MUF statistic is the closest that the agency verifies the material balance. In reality, it falls very far short of what is intended, because of holes in the system which provide the MUF.

Because of the inherent difficulties of the MUF statistic, the agency has attempted to implement a system of "timely detection" at sensitive facilities. Such implementation is, at the present time far beyond the capabilities of the agency to implement and beyond the willingness of the countries to undertake. It goes beyond the Blue Book, some believe, and would require massive amounts of sampling and verification, and real-time knowledge of the amounts of nuclear material moving between installations, rather than after the fact notification. At the present time, such efforts are only in their early stages.

Containment and surveillance measures

Article 29 also refers to containment and surveillance measures. At the present time, this refers primarily to seals in the containment category, and cameras in the surveillance category.

In the case of seals, the agency mainly uses the so-called "IRS Type-E" seal. This seal has been around for a long time, and as early as about 10 years ago, efforts were underway by at least one foreign government to "break it." The seal has been "beefed up" by the agency, but is basically an old device that requires labor intensive "post-mortem" examination, which verifies that the seal removed is the same one that was originally emplaced, rather than a counterfeit. The post-mortem examination is not necessarily capable of determining whether the seal was surrepitiously opened and then reassembled.

The agency also uses paper seals. According to expert authority, these seals are useful for only a few hours at best, because they can be removed and replaced, and also because they can be duplicated by a good printer.

There are several other seals around, but none of these have been used, except in limited tests.

In any case, a second basic shortcoming of the use of seals is that the item sealed can often be accessed by bypassing the seal.

Camera surveillance is of two types. One is the film camera, such as an 8mm Minolta. These are typically used in pairs in a sealed enclosure. They are set, in a power reactor, to each snap a picture at 15- or 20-minute intervals, so that, at best, there is only 7 to 10 minutes between snaps. These are intended to detect movements of large items, such as a cask bearing fuel assemblies.

The other type of camera is the TV camera, which turns on at predetermined intervals and snaps 8 or so frames.

Generally, the quality of pictures obtained is extremely poor. Further, there have been numerous failures. There have been significant improvements recently in reliability, but failures still occur at an alarming rate.

One scenario, which has appeared in several literary sources, is the placement of a photograph of the viewed scene in front of the camera. This is plausible, because the illumination level normally changes as lights are turned off and on, and the frames typically jump around. But there are also more sophisticated ways to defeat the camera.

A basic difficulty associated with containment and surveillance devices is that the device is not under the continuous observation of the inspector, as would be an alarm system in an industrial setting.

In my experience, another basic difficulty with both film type and TV type surveillance is that the image is often typically not clear enough to be meaningful. Typically, many activities occur on the film that are rather baffling. Also, people stand in front of the camera and barriers are erected that block the view. The camera may be moved. The lights may go out. And, often, the camera simply fails. Further, the interval between pictures is intended to protect against a known scenario, such as a cask movement to remove fuel, where it is assumed that the agency really knows how long the activity will take, so that the movement would be caught on film, whereas it might not really be known.

Safeguards at specific types of installations

Reprocessing plants.—During my employment with the IAEA, I inspected at the reprocessing plants of PNC at Tokai Mura in Japan, GWK (WAK) at Karlsruhe in FRG, and once, Cogema at Cap de la Hague in France. The first two facilities were under "continuous" inspection regimes. The latter facility only stored fuel under safeguards, but had not reprocessed any of it. Basically, uncertainties associated with reprocessing plants involve, at best, several percent uncertainty of MUF. At worst, a lot of other possibilities open up, including the possibility that an installation might reprocess undeclared irradiated fuel, or understate the plutonium content of the declared fuel. One installation was rumored to have possessed [sic] an undeclared, never used, natural uranium storage pond, for example. In a reprocessing plant, therefore, one should look for hidden fuel as well as account for declared fuel. But the agency does not attempt to find undeclared fuel. For example, if a plant operator says that no fuel will be processed for one month, the agency will stop sending inspectors for a month.

In the case of understating the plutonium content of the input dissolver solution, the scenario would entail diverting some of the input dissolver solution to avoid measuring it in the input accountability tank. At a later time, the diverted solution would be transferred from its location in, say, a tank of the rework system, where it had been stored, to the extraction and purification systems, in order to extract the plutonium, at a time when the plant was declared "down" and not under inspection. The uranium solution needed to make up for the diverted uranium contained in the divertered [sic] dissolver solution would be replaced from uranium in storage, since uranium quantities are known from fuel element manufacturer's data.

This type of scenario is simply not covered by IAEA safeguards. IAEA rather bases its safeguards primarily on operator's data supplemented by camera surveilance. I know of no case where recycle acid was verified, for example, or where valves were sealed to prevent undeclared transfers. Samples are taken of the input and output solution, but are drawn from sample ports that have not been verified by design information review, so that one can't be certain where the sample came from. Further, the samples are handled in the plant by the operator and may be prepared by the operator, before shipment to Vienna. In one case, the operator and country refused to allow shipment of samples for a year on the grounds that it was illegal due to the absence of an approved shipping container. Finally, after the samples had been in the operator's control for a year, the agency was asked if they could be discarded because they had been standing so long. The agency agreed.

In addition, because the samples must be diluted before shipment, analytical accuracies are reduced at Seibersdorf.

In the case of the Cogema facility, there is no input accountability tank, so that input accountability will probably have to be based on reactor data.

An independent means of assessing the plutonium content of spent fuel is by burnup calculations and isotopic correlation techniques. Unfortunately, burnup calculations, which require verification of reactor operator's data, is not even done on an occasional basis by the agency. Neither are isotopic correlation techniques applied. The agency simply takes the word of the operator as to the plutonium content of the spent fuel and checks that against what it finds at the reprocessing plant, subject, of course, to the limitations of that finding.

Research reactors.—In the case of research reactors, as in power reactors, the potential exists for undeclared breeding of plutonium and/or U-233. In the research reactors that I inspected, of which there were several, there were no containment or surveillance measures provided to address these possibilities, nor am I aware of any measures which would have been effective. Typically, research reactors are inspected infrequently, perhaps once annually. The agency's camera surveillance would be unable to distinguish between irradiation of fertile material samples to produce plutonium or U-233 and irradiation of medical samples, for example, even if a camera could run unserviced for one year.

One medical use of research reactors, incidentally, is irradiation of highly enriched uranium to produce molybdenum-99, which is extracted and decays to technecium-99. The Tc-99 is used for medical scanning for tumors. After irradiation, most of the U-235 still remains in the target, which is typically mixed in concrete, prior to ultimate disposal. The highly enriched uranium could be extracted, however, as a potentially attractive source of kilogram quantities of weapons grade material prior to the mixing with concrete. This extraction would probably not be detected by IAEA safeguards, since an IAEA inspector may only visit such an installation annually for one day.

Critical facilities.—One critical facility which I visited contained hundreds of kilograms of low exposure, weapons grade plutonium. A facility of this type is sensitive from the abrogation scenario standpoint where, under some sort of immediate threat, the country simply takes possession of all the nuclear material for immediate manufacture into nuclear weapons components. About 100 kg of this material was under IAEA seal. During biweekly "time detection" inspections, the inspectors would visually check the type E seals on this material, in spite of the fact that these seals can be counterfeited, so that only postmortem examination at headquarters is meaningful.

I once demonstrated to the operator and the inspection team leader that, due to the absence of some needed holes in the lid and body of the container, the sealing system was inadequate; the containers could be opened, the material removed, and the lid replaced simply by removing two bolts, without disturbing the seal. I also brought up this problem in Headquarters upon return from mission. However, this situation was not corrected, possibly because agency personnel had collaborated with the operator on the method by which the seal would be applied in the first place and felt partially obligated to go along with the outcome, when the operator said that the holes could not be drilled.

The method of safeguarding a major critical facility entails monthly sampling and remeasurement of unsealed fuel plates. The fuel plates can be remeasured to within about 3 percent by NDA [Nondestructive Analysis]. Perhaps 1 percent of the material could be removed by, say, drilling or remanufacture of the plates, without detection likely but this type of scenario is considered unlikely. Chemical analysis by the agency for highly accurate measurement of a suspect fuel plate is not foreseen in the usual facility attachment.

Power reactors.—Power reactors are of various types, and can be classified according to whether on- or off-line refueled, types of moderator and coolant, whether natural or enriched uranium, etc. Online refueled reactors are considered more sensitive and safeguarding was primarily by counting all fuel elements and check of serial numbers against the invoice of unirradiated fuel elements. Identification of serial numbers on spent fuel is usually impossible. Although there is work underway, especially in Canada, to automatically count fuel elements, this was not done in my experience. Counting of power pulses on a chart was the means of verifying the number of fuel elements changed in the core in one instance, but "noise" pulses on the chart made this of dubious value. Camera surveillance was intended for loadout pond, to detect undeclared loadout of irradiated fuel by that route.

In the case of off-line refueled reactors, camera surveillance was used in the spent fuel pond area to detect undeclared loadout and seals were employed on the reactor head and/or at the entrance gate to the spent fuel pond between refuelings. Fuel elements were counted and serial numbers on unirradiated fuel elements were verified at inspections. In both cases, physical inventories occurred at annual to 18-month intervals. Nondestructive assay verification was permitted at that time. Inspection frequency ran from 3-month to 6-month intervals.

Verification of reactor operating history was by reviewing strip charts of power, steam flow, temperature, or neurton flux. Typically, a maximum of two charts were permitted to be reviewed. Access to the control room was not permitted. Rather, the charts would be removed and brought to the inspector for review in a meeting room.

The possibility of irradiation of additional fuel contained in normally nonfuel-bearing structural components of the fuel assemblies was not covered by the inspection approach of power reactors, although this has been discussed in a report on technical assistance to the agency by the U.S. The possibility of an adaptation to facilitate the irradiation of fertile fuel by other means was also not covered. For example, there is no close inspection of the reactor vessel prior to operation or at the time of maintenance to detect a shuttle system. Burnup calculations to determine the amount of plutonium in spent fuel were not verified, not were power monitoring devices verified.

Fuel fabrication, conversion, and unirradiated scrap recovery.—This part of the fuel cycle centers around the fabrication of fuel for the various types of reactors and critical assemblies.

In larger facilities, the IAEA makes approximately monthly inspections of one day duration, performs an annual physical inventory verification of several days' duration and, where large quantities of direct use material are present, more frequent inspections may be made. A basic difficulty that I observed here are unwillingness to take samples and ship them to the agency's Seibersdorf Laboratory, on the grounds of cost or shipping regulations. In one European installation that I was aware of, the operator wanted $10 000 per sample from the agency. A problem that I encountered was unwillingness to allow the agency to use nondestructive assay equipment that required small radioactive sources in their operation. The operator claimed that national regulations did not permit the presence of those particular sealed sources in his plant, in spite of the presence of large quantities of plutonium.

In that installation, the operator and state had refused to permit the agency to apply timely detection continuous inspection at the facility by virtue of its contention that inspection was limited by the Blue Book to flow and inventory key measurement points. As a result, the agency "punished" the state by reduced inspection to 2- or 3-month intervals. In this case, the state did agree after several years to the timely detection inspection on a trial, informal basis to parts of the facility. But, without full cooperation and a serious investment in computer hardware and extensive accurate measurements, which I have yet to see, timely detection is of limited value.

The agency's approach to verification is based upon a report, BNWL–1852, "Example of Verification and Acceptance of Operator Data—Low Enriched

Uranium Fabrication Plant," Battelle Pacific Northwest Laboratory, Richland, Washington, August 1974. This report provides the framework for the concept of verification of strata of flows into and out of the plant, as well as in beginning and ending physical inventories. A material balance for a period of time is formed by the plant operator from the following components on the right side of the equation: MUF=BI+A–R–SR–EI, where MUF is material unaccounted for, BI is beginning physical inventory, A is additions to inventory, R is removals from inventory, SR is shipper-receiver difference [and] EI is ending physical inventory.

If everything could be measured perfectly and there were no mistakes or unaccounted for losses or diversion, MUF would come out equal to zero for a material balance period. But due to normally occurring errors of measurement, MUF is typically not zero, but indicates apparent "loss" or "gain." The idea is to determine whether the MUF is only due to measurement error or also due to unaccounted for loss, diversion, or a mistake.

Normally, the components of the material balance will be composed of several strata each. For example, BI may be composed of good substrate material, the product material which is manufactured from the substrate, scrap and waste. The agency, ideally, verifies each stratum of each component of the material balance. In reality, it seldom is able to verify each component. In any case, it attempts to detect a diversion of a significant quantity of nuclear material by verifying a sufficient number of items in each stratum to provide a desired power of detection, (1–B), of the loss of a significant quantity with a tolerable false alarm rate, α. A theorem is derived which addresses the problem of whether the diversion of a significant quantity, if "partitioned across" (took place in) more than one stratum, would be detected with adequate power. The theorem shows that, if diversion were partitioned across more than one stratum, the power of detection would be as great as or greater, by virtue of a defect being found in at least one stratum, than if the diversion of the significant quantity had occurred all in one stratum.

The fallacy inherent in this approach is that there will often be at least one defect due to a mistake. Thus, if any mistake is found, the agency must alarm to the hypothesis of diversion by partitioning. And there are often false alarms (mistakes). This is even more serious when one considers that the country is the adversary, so that partitioning across all installations in a country must be assumed if any alarm occurs. Since it is patently not feasible to alarm to the possibility of diversion by partitioning across the state whenever a mistake is found, the conclusion that one reaches is that the agency is incapable of detecting the diversion of a significant quantity or of several significant quantities, by partitioning, in any state with a moderate to large nuclear energy establishment.

What materials this report has concerned

IAEA safeguards are aimed at the control of certain direct-use materials, namely: high enriched uranium, U–233, and plutonium; and certain indirect-use materials, namely: low enriched, natural, and depleted uranium and thorium which can be converted to direct-use materials. IAEA safeguards do not control uranium ore, neptunium, and a number of other materials which are controlled in the United States by DOE and/or the NRC. Uranium ore, for example, can be converted rather simply to uranium in a form that is an indirect-use material. Absence of its control is probably one of the glaring weaknesses of international safeguards today.

A large LWR produces roughly 15 kg of neptunium–237 per year, according to the Nasap [DOE's Nonproliferation Alternative Systems Assessment Program] study. The unmoderated spherical, critical mass of neptunium–237 is roughly 60 kg. Its control will probably be required in the future.

In this report, I have attempted to describe how IAEA safeguards work and some of their weaknesses. I have not addressed all issues; there are many which are presently the subject of r&d efforts by several countries, for example. But I hope that I have identified some of them. I think that it is clear at this point that there are not many simple solutions and that a great deal of effort and commitment of all parties will be required to address these issues.

Senator **Cranston** [presiding]. Paul, I want to join Senator Percy in his remarks about your past work on the Hill, and I am glad you are still coming to the Hill to give us your sage advice.

Mr. **Leventhal**. Thank you.

Senator CRANSTON. As a drafter of the nuclear nonproliferation legislation—you went into this a bit, but I would like for you to expand slightly—what is your view as to NRC's obligation to insure effectiveness of export safeguards before issuing export licenses?

Mr. LEVENTHAL. When you say insure, there is not much the Commission can do as an agency to upgrade IAEA safeguards except to provide whatever technical expertise it has available to the Agency. In terms of making a determination, though, I think that is the obligation of the Commission under the Atomic Energy Act of 1954, including the amendments in the form of the Nuclear Non-Proliferation Act.

The noninimicality finding, as it is called—that is, that every licensed activity has to be certified by the Commission not to be inimical to the common defense and security—is very powerful statutory language, and I think in view of the testimony heard today, the Morgan memorandum itself, the Department of Defense's own assessment, and finally, the assessment of the Commission itself in the letter just received on the Hill—all of these would indicate that IAEA safeguards cannot and should not be relied upon to protect the national security interests of the United States.

If that be the case, it would appear that the Commission has no choice under the law but to withhold approval of exports until such time as safeguards are such that they can be relied upon to protect the national-security interest of the United States.

Senator CRANSTON. I agree with you in what you have stated about Pakistan, that it makes no sense to have a policy of going along with providing them military equipment and acting as if they are not embarking upon a nuclear program, making our only test, do they test it, when plainly, as John Glenn indicated this morning, and as you and I well know, a nation could produce and stockpile weapons, not test them, and have reasonable confidence that, if need be, they could proceed to use them. Our policy would then be absolutely meaningless.

Do you have any thoughts on the matter of what beyond even a perfect IAEA should be done to be more effective in dealing with the danger of nuclear proliferation?

Mr. LEVENTHAL. I would like to point out that there is a program underway that has received very little public attention and only the most cursory support from within the IAEA. It is a terribly exciting and promising program in terms of the extent that it could upgrade the quality of certain aspects of safeguards, particularly surveillance and containment which, when you come right down to it, is the ultimate protection. Assuming you cannot account for everything, you at least want to make sure that physically you are assured that material is not being diverted.

In this regard I am referring to a two-part program initiated by ACDA called Operation Recover, and Operation Transceiver. It involves the latest satellite and computer technology capable of providing the IAEA on a real-time basis—via satellite directly from facilities being safeguarded and directly from shipments being transported between countries—the monitoring of electronic seals (so called fiber optic seals), camera transmission (via television), as well as—and perhaps this is the most important—the power-generation level of reactors, so that you can calculate accurately how much plutonium has been generated and therefore has to be accounted for. Right now there is great imprecision—and this is a very basic flaw of safeguards—over how much plutonium is actually contained in the spent fuel.

This is technology that is relatively inexpensive to apply. It is being tested now on a pilot basis in about a half dozen countries by the IAEA at a cost of about $150,000 a year. If this technology were applied universally among the 700 or so facilities being safeguarded, the cost might be in the area of $5 million or $6 million, which is by no means astronomical in an industry valued at over $1 trillion, where individual plants sell for $1 billion or more.

We have to ask ourselves why is it so difficult to get the bureaucracy to pursue, and the IAEA and the industry to accept this potential upgrading of safeguards that would so drastically relieve the whole labor-intensive safeguards approach now being applied. Inspectors now must travel from facility to facility applying seals, developing film, looking at pictures. There is a potential here that is being explored, but with nowhere near the sort of enthusiasm and determination that should be applied.

Senator Cranston. Thank you very much.

I would like to pose this question to either you, Mr. Morgan, or you Mr. Shea, and I appreciate your coming all the way from California to this hearing today.

Do you agree with the NRC's conclusion that the IAEA's safeguards system would not detect a diversion in at least some types of facilities?

Mr. Shea. I guess I would ask the question how much of a diversion and within what time period. Certainly within almost every facility there is some small quantity of material and some period of time over which the Agency would be completely ineffective at detecting diversion. Also, to be sure, at the opposite extreme, the diversion of a very large quantity of material would be detected in a reasonable period of time. The time periods that are chosen for organizing the inspections are chosen just to provide opportunities for detection in a timely manner, or what is considered to be "timely" by international agreement.

If we talk about detecting diversions of significant quantities that have been defined within the Agency, of 8 kilograms of plutonium, for example, then, the scale of a facility becomes very large, the probability of detection based on mass balance accounting would become increasingly small. But even then, there are possibilities for detection other than just through this mass balance accounting type of an approach. The quantification of safeguards effectiveness that would enable the IAEA to state the effectiveness of all safeguards measures is under active development at this point.

I think a categorical statement is not correct and is really not warranted.

Senator Cranston. I will ask for your comment, Mr. Morgan?

But first, I would like to note that you substantiated and agreed with much that Roger Richter said when he was before us, the inspector who came and testified at the hearings on the Iraq reactor matter, and it was helpful to have your testimony substantiating his statements in today's record.

Mr. **Morgan**. There are several questions because there are several ways that IAEA safeguards, and one should recall that present IAEA safeguards are only part of the picture because they simply do not cover certain materials not safeguarded by IAEA that could be used by a country.

But nonetheless, if I were starting a Manhattan project, I would certainly consider the commercial nuclear industry to be a good source of nuclear materials.

I think IAEA has to address the problem of what are the ways that diversion could occur. At the present time—this is in my testimony actually—this is not adequately covered.

I concur with the NRC totally. The problem is that we are attempting to detect certain quantities diverted. We are not covering all avenues of diversion. Finally, in the limiting situation, the quantities that we are attempting to detect cannot actually be detected because of the problem of false alarms. There is no way to get around the false alarm situation. You are bound to have situations that look like diversion that are not and the reverse.

I think that we have to talk about much more extensive inspection effort than we are presently talking about.

Senator **Cranston**. Thank you very much.

Mr. **Morgan**. Yes, sir.

Mr. **Leventhal**. Senator, if I might comment on that, I think a very good question to pose is not so much whether a diversion would be detected but whether plutonium, a plutonium reprocessing plant or a plutonium fabrication plant can be effectively safeguarded against a nation that wants to divert. Since we are heading into a plutonium economy, assuming the industry gets its way, that is the nub of the question. Is it possible to safeguard separated plutonium or, for that matter, highly enriched uranium as a commercial fuel?

Senator **Cranston**. What is your answer, yes or no?

Mr. **Leventhal**. Well, I have testified already that everything that I have seen indicates it is not possible, and you have the additional physical security problem, which is extremely serious.

Senator **Cranston**. I want to say at this time that the GAO witness has departed. The GAO submission will appear in the record. For the reasons advanced by Chairman Percy, we really did not need their verbal testimony.

Senator Kassebaum is waiting to open another hearing at 1:30. She has been delayed by our hearing. So we are therefore compelled to adjourn at this time.

I thank you all very much for your presence here today, and I thank the witnesses for their very helpful testimony.

[Additional questions and answers follow:]

COMMISSIONER GILINSKY'S RESPONSES TO ADDITIONAL QUESTIONS SUBMITTED FOR THE RECORD

Question 1. Can you suggest some alternatives to IAEA Safeguards?

Answer. A different international system of inspection does not seem to be a practical alternative. Should the IAEA be unable to carry out its responsibilities, we shall have to rely to a greater extent on our own resources and bilateral arrangements.

Question 2. How important is it for the United States to try to keep other countries from commercial use of plutonium as a fuel?

What political price would the United States have to pay to compel other countries not to use plutonium?

Answer. Plutonium and, I should add, highly enriched uranium are both nuclear explosives. They can be fabricated into bombs so rapidly that we cannot count on any inspection system discovering a diversion in time to permit action to be taken by other states to prevent the bombmaking. In short, these materials cannot be protected by IAEA safeguards. Keeping these materials out of commercial channels is important because it means keeping nuclear explosives out of commercial channels.

I would not put the second question in terms of political price. What we need to do is to gain agreement to the proposition that it is to everyone's benefit to get these nuclear explosive materials out of commercial channels.

Question 3. Although the NRC has been invited to take part in some executive branch visits to look at safeguards in other countries, is this sufficient to render a judgment? Should the NRC have statutory authority and responsibility to visit other countries?

Answer. These Executive Branch visits deal with physical security, that is, protection against potential thieves other than the governments of the countries in which the facilities are located. IAEA safeguards are designed to protect against diversion by the governments.

We have not contemplated visits to other countries to check on safeguards, although the NNPA does not prohibit it.

It would be helpful if we could get detailed reports from the IAEA on the status of materials and facilities we have exported. That would go a long way toward obviating the need for other contacts by the NRC.

Question 4. In your opinion to what extent would unilateral U.S. actions to tighten restrictions of nuclear materials contribute to nonproliferation?

Answer. "Unilateral" action has become the great bugaboo of nonproliferation policy. The fact is that collective action toward restraining the more dangerous aspects of nuclear trade is impossible without vigorous U.S. leadership. And such leadership must start with "unilateral" U.S. action. Despite all the talk about "loss of leverage," and so on, our example is still very important.

Question 5. Would the NRC recommend that the IAEA be split into two parts—one for technical assistance and one for safeguards? Is this feasible?

Answer. I think it would be a good idea, although it is doubtful that the support of the member states could be mustered for such a change.

Question 6. Now that the United States has voluntarily placed some of its nuclear facilities under IAEA inspection, what are the prospects that an IAEA inspector from another nation could make complaints similar to those Mr. Morgan made?

Answer. I would hope that the U.S. authorities and the operators of the safeguarded facilities would adopt a forthcoming attitude toward IAEA inspectors. However, an inspector of a weapons state which has voluntarily placed a few facilities under safeguards could be forgiven if he harbored doubts about the usefulness of his work.

STATE DEPARTMENT'S RESPONSES TO ADDITIONAL QUESTIONS SUBMITTED BY SENATOR GLENN

MORGAN REPORT

Question 1. In his report to the Nuclear Regulatory Commission on IAEA safeguards adequacy, Mr. Morgan notes that there has been at least one attempt by a foreign government to defeat IAEA seals. Is the U.S. Government aware of any such episode or episodes and, if so, please provide the particulars. Was the Congress made aware of any of these episodes and, if so, please state when this information was communicated and to whom.

Answer. The U.S. Government is not aware of any episode where an attempt was made by a foreign government to defeat IAEA seals that have been applied to safeguard material.

Question 2. In his report, Mr. Morgan, after stressing the importance of design information reviews by the IAEA, states that he is not aware that the IAEA has even undertaken any design review for a reprocessing plant. Did the IAEA undertake a design information review with respect to the Tokai-Mura plant? If so, please provide a description of the comprehensiveness of this review, and if not, please explain why such a review was not undertaken and what the impact of the lack of such review has been on the adequacy of safeguards at the facility.

Answer. The IAEA conducts a review and verification of design information submitted by the host state on all facilities it places under safeguards. This review and verification is normally carried out prior to and during the first "ad hoc" inspection the IAEA undertakes at a facility. This procedure was followed at the Tokai Reprocessing facility in Japan. In addition, during the course of the Tokai Advanced Safeguards Technology Exercise, (TASTEX) which was centered at the Tokai facility, Japan made additional information available to the participants, including the IAEA and the United States, that is normally required for a design information review. This information was thoroughly analyzed and discussed by all participants as part of the process of defining and developing new safeguards techniques for use at the facility. We understand design reviews have been carried out for reprocessing plants in other countries.

Question 3. Mr. Morgan also points out the importance of tank calibration at reprocessing plants but indicates that such verification activity is only rarely carried out by the IAEA, for a variety of reasons. Were tank calibrations properly performed and witnessed by the IAEA at the Tokai-Mura plant? If not, what effect has this had on the adequacy of safeguards at the facility?

Answer. Tank calibrations were carried out at the Tokai Reprocessing facility as part of the process of bringing the facility on line. Since then the accountability tanks have been recalibrated a number of times with the IAEA verifying the recalibration.

The problems associated with safeguarding reprocessing plants are difficult ones. Many of them have been successfully addressed, especially at the Tokai facility, through TASTEX. However, it is clear that much work has yet to be done, both in implementing some of the instruments and techniques that have been developed and in gaining long term experience in using them. The U.S. Government is working actively with Japan and the IAEA to expedite the implementation process. We are also working to further develop some of the techniques studied during TASTEX that show promise of contributing to reprocessing plant safeguards but are not at the point where they can be put into routine safeguards use by the IAEA.

NAKICENOVIC REPORT

Question 4. Dr. Nakicenovic suggests that the Board of Governors of the IAEA is not kept fully and currently informed by the Director General and mentions an instance which was not reported to the Board involving IAEA inspectors' discovering the unauthorized removal of a fuel element from a facility. Please provide the specifics of this episode and any information you may have as to why it was not reported to the Board.

Answer. The IAEA does not "authorize" the removal of spent fuel or anything else from any facility it has under safeguards. The state in which the facility resides undertakes to inform the IAEA of movements of material that the IAEA has under safeguards in order to facilitate the application of those safeguards. There is usually the requirement that the state not only report all such movements but also, give the IAEA sufficient advance notice so that it can verify the shipment at loading, apply seals to shipping containers before shipment and allow the Agency to verify those seals after receipt to attest to the integrity of the contents. Beyond this the IAEA plays no role in the shipment process.

As might be expected with the number of transfers of materials within facilities and of shipments of nuclear material every year reaching many thousands reporting procedures can, and do, fail from time to time. There may have been cases of movement without reporting but these do not represent diversions. The United States and other IAEA member states are currently working closely with the Agency to improve the reporting system.

Question 5. Dr. Nakicenovic identifies six needed improvements in safeguards on page 12 of his report. To what extent do you agree with these needed improvements and what steps may have been taken by the United States or the IAEA to implement such improvements?

Answer. All of the six suggested improvements on page 12 of Dr. Nakicenovic's report have been, or are currently being, addressed by the IAEA with the aid of the United States and other IAEA member states. Specifically, the IAEA is currently applying diversion path analysis to some types of facilities and is planning to do so for all types of facilities under safeguards. This analysis has been developed with the help of United States cost free experts supported through the U.S. support program to Agency Safeguards (POTAS) and in cooperation with expert consultants to the IAEA from several other states.

The United States was, and continues to be, instrumental in developing reliable, tamper resistant cameras and seals for Agency use. Through POTAS the United States continues to develop improved seals and cameras. Some of the seals and cameras improved through POTAS are now in routine IAEA use. The United States has also developed some nondestructive assay instruments that are now in routine use.

A listing of some of the instruments developed by the United States and turned over to the IAEA is attached.

Fuel bundle counters are useful tools in safeguarding on load refueled reactors. The principal reactor of this type is the Canadian build CANDU heavy water reactor. Through its support program to IAEA safeguards Canada has developed and is installing such counters on its reactors and those it produces for export. The Agency is also in the process of installing such counters on other on-load reactors that are under safeguards. The United States has contributed to the development of these instruments.

U.S. assistance provided direct financial contributions to the IAEA to permit early acquisition of a larger computer, peripherals, and software for the new IAEA safeguards information system. Other equipment was provided as gifts-in-kind as were cost-free experts to assist the IAEA in planning, system design, and programming. This information system is currently in operation.

Recently the IAEA has permanently stationed inspectors in Japan as well as in Canada. This should lead to greater efficiency in the use inspector resources. Other possibilities for more effective use of manpower by the IAEA, including the possibility of other field offices, are being considered.

Question 6. Dr. Nakicenovic strongly criticized the finding in the Director General's annual report that no diversions of safeguarded materials have taken place during the preceding year. In view of the inadequacies of inspection effort documented in the Battelle Report, and the insufficiencies noted in the Morgan Report, is it your view that IAEA safeguards activities provide a valid and sufficient basis for such conclusions?

Answer. The Director General's statement says: "In 1980, as in previous years, the Secretariat, in carrying out the safeguards programme of the Agency, did not detect any anomaly which would indicate the diversion of a significant amount of safeguarded nuclear material—or the misuse of facilities or equipment under certain agreements—for the manufacture of any nuclear weapon, or to further any other military purpose, or for the manufacture of any other nuclear explosive device. The Secretariat therefore considers it reasonable to conclude that the nuclear material under Agency safeguards remained in peaceful nuclear activities or was otherwise adequately accounted for."

The IAEA, elsewhere in the same document, provides detailed information on the degree to which inspection goals were achieved. In many cases they were, and in others they were partially achieved. This might mean, for example, that some less significant diversion paths were not covered, or that verification was less timely than desirable in some cases.

Overall, we believe the IAEA's report is a correct representation of the IAEA's findings and that safeguards as applied are sufficient to support the statement in the report. We agree of course, with the IAEA that safeguards can and must be improved in order to increase the assurance provided by the IAEA's findings.

BATTELLE PACIFIC NORTHWEST LAB STUDY

Question 7. Do you agree with the conclusion of the report that IAEA inspection efforts would have to be increased over 10-fold-from 3,300 man-days of inspection to 35,000 man-days of inspection at safeguarded facilities—to achieve the Agency's safeguards objectives? What do you believe is the significance of the discrepancy between actual man-days of inspection and those necessary to attain the Agency's safeguards goals in terms of the overall adequacy of safeguards?

Answer. We agree that the IAEA will have to significantly increase its pool of trained inspectors over the next several years in order to reach their specific goals for the application of effective safeguards at the increasing number of facilities under its jurisdiction. The increase required to meet the Agency's objective of applying effective, and efficient safeguards will depend, inter alia, on the type and quality of equipment available to the IAEA, the quality of its inspectors, the complexity of the facilities it safeguards, the diversion strategies that are considered sufficiently realistic to require safeguards coverage and the degree of assurance (detection probabilities) to be sought for the diversion strategies. The resource estimates calculated in the Battelle study are for a particular set of assumptions regarding these factors. Until the validity of such assumptions for specific facilities is determined, which only the IAEA can reasonably do, it is not possible to judge particular estimates based on any given set of assumptions such as those in the PNL study.

Question 8. The report states that the Agency's agreed upon normal inspection effort for reprocessing plants as specified in facility attachments is from 400–500 man-days but that 1,500 man-days of inspection effort are needed to achieve the Agency's objectives. If the Agency's average routine inspection effort is so much lower than what is apparently needed, how can safeguards at these extremely sensitive plants be effective? Does a discrepancy of this magnitude apply to safeguards efforts at the Tokai-Mura facility in Japan?

Answer. Safeguards approaches to reprocessing plants are rapidly evolving. The results of the TASTEX work and its follow on activities are just beginning to be understood and utilized. Therefore any estimates of the manpower required to safeguard a reprocessing plant is subject to considerable uncertainty, as the Battelle report cautions. For this and the general reasons outlined in the above answer, we do not consider the estimates in the Battelle report as being established as requirements. The PNL number of 1,500 man-days/year is based on assumptions which may not be valid for the Tokai facility and the report does not give enough information on how this estimate was derived to permit an assessment of its correctness. In addition, the amount of inspection effort actually needed at a facility depends on actual plant operating schedule and throughput. So far the Tokai plant has not operated full time and the annual throughput has been considerably less than the 200 tonnes assumed in the Battelle study.

Question 9. The report also states that at plutonium fuel fabrication plants the study estimates that 1,500 man-days of inspection per year are needed to achieve the Agency's safeguards objectives, but the Agency's typical inspection effort, as specified in facility attachments is only 300 man-days, and in actual practice Agency inspection effort is lower than this. Do you agree with these estimates? What do you believe the impact on safeguards effectiveness is as a result of the discrepancy between needed inspection effort and actual inspection effort at plutonium fuel fabrication plants?

Answer. The amount of inspection effort that is necessary for effective, efficient safeguards at mixed oxide fuel fabrication plants is based on a number of factors. These include the form of the material (metal, oxide, mixed oxide, nitrate solution, etc), amounts of material in inventory, throughput of the plant, amount of material in process, etc. The same general comments made in the answers to the two preceding questions concerning the validity of such man-power estimates also apply here. In addition the Battelle report states that the three facilities under safeguards have annual throughputs of about 500 kilograms of plutonium which is considerably less than 1,500 kilograms per year on which the estimates in the Battelle report are based.

Device (Task No.)	Devices provided to IAEA	Application
BSAM (A.55)	5	NDA–Unirradiated U and Pu.
Hand-held Ge (A.13)	2	Do.
SAMson (A.11)	4	Do.
Mini-MCA (A.74)	2	Do.
HLNCC (A.95)	7	NDA–Pu and MOX.
AWCC (A.96)	2	NDA–HEU.
Collar (A.75)	3	NDA–Unirradiated fuel assemblies.
Microcomputer (A.63)	1	NDA–Pu and MOX.
SGS (A.7)	1	NDA–Pu scrap and waste.
Semiportable load cell (A.98)	1	Mass of UF_6 cylinders.
ION–1 (A.97)	3	NDA–Irradiated fuel.
Javelin (E.21)	4	Cerenkov light, irradiated fuel.
ITI underwater viewer (E.35)	1	Serial number on irradiated fuel.
Semiautomatic film scanner (E.27)	1	Reviewing surveillance film.
Battery-operated TV (E.5)	1	Optical surveillance.
Advanced TV (E.25)	2	Do.
Reactor power monitor (E.24)	1	Monitoring power reactor operation.
Calorimeters (A.9)	3	NDA- Pu and MOX.
Electronic seals (E.37)	10	Safeguards seal.
Type-X seals (E.28)	500	Do.

This committee is adjourned.

[Whereupon, at 1:35 p.m., the committee adjourned, subject to call of the Chair.]

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